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SELECTED WATER RESOURCES ABSTRACTS

VOLUME 6, NUMBER 14
JULY 15, 1973

W73-08451 -- W73-09100

U.S. DEPARTMENT OF THE INTERIOR
OFFICE OF WATER RESOURCES RESEARCH
WATER RESOURCES SCIENTIFIC INFORMATION CENTER

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SELECTED
WATER RESOURCES ABSTRACTS

A Semimonthly Publication of the Water Resources Scientific Information Center,
Office of Water Resources Research, U.S. Department of the Interior

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VOLUME 6, NUMBER 14
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The Secretary of the U. S. Department of the Interior has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through August 31, 1973.

As the Nation's principal conservation agency, the Department of the Interior has basic responsibilities for water, fish, wildlife, mineral, land, park, and recreational resources. Indian and Territorial affairs are other major concerns of America's "Department of Natural Resources."

The Department works to assure the wisest choice in managing all our resources so each will make its full contribution to a better United States—now and in the future.

FOREWORD

Selected Water Resources Abstracts, a semimonthly journal, includes abstracts of current and earlier pertinent monographs, journal articles, reports, and other publication formats. The contents of these documents cover the water-related aspects of the life, physical, and social sciences as well as related engineering and legal aspects of the characteristics, conservation, control, use, or management of water. Each abstract includes a full bibliographical citation and a set of descriptors or identifiers which are listed in the **Water Resources Thesaurus.** Each abstract entry is classified into ten fields and sixty groups similar to the water resources research categories established by the Committee on Water Resources Research of the Federal Council for Science and Technology.

WRSIC IS NOT PRESENTLY IN A POSITION TO PROVIDE COPIES OF DOCUMENTS ABSTRACTED IN THIS JOURNAL. Sufficient bibliographic information is given to enable readers to order the desired documents from local libraries or other sources.

Selected Water Resources Abstracts is designed to serve the scientific and technical information needs of scientists, engineers, and managers as one of several planned services of the Water Resources Scientific Information Center (WRSIC). The Center was established by the Secretary of the Interior and has been designated by the Federal Council for Science and Technology to serve the water resources community by improving the communication of water-related research results. The Center is pursuing this objective by coordinating and supplementing the existing scientific and technical information activities associated with active research and investigation program in water resources.

To provide WRSIC with input, selected organizations with active water resources research programs are supported as "centers of competence" responsible for selecting, abstracting, and indexing from the current and earlier pertinent literature in specified subject areas.

Additional "centers of competence" have been established in cooperation with the Environmental Protection Agency. A directory of the Centers appears on inside back cover.

Supplementary documentation is being secured from established discipline-oriented abstracting and indexing services. Currently an arrangement is in effect whereby the BioScience Information Service of Biological Abstracts supplies WRSIC with relevant references from the several subject areas of interest to our users. In addition to Biological Abstracts, references are acquired from Bioresearch Index which are without abstracts and therefore also appear abstractless in SWRA. Similar arrangements with other producers of abstracts are contemplated as planned augmentation of the information base.

The input from these Centers, and from the 51 Water Resources Research Institutes administered under the Water Resources Research Act of 1964, as well as input from the grantees and contractors of the Office of Water Resources Research and other Federal water resources agencies with which the

Center has agreements becomes the information base from which this journal is, and other information services will be, derived; these services include bibliographies, specialized indexes, literature searches, and state-of-the-art reviews.

Comments and suggestions concerning the contents and arrangements of this bulletin are welcome.

Water Resources Scientific Information Center
Office of Water Resources Research
U.S. Department of the Interior
Washington, D. C. 20240

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ABSTRACT SOURCES

SELECTED WATER RESOURCES ABSTRACTS

01. NATURE OF WATER

1B. Aqueous Solutions and Suspensions

INFRARED REFLECTANCE OF SULFATE AND PHOSPHATE IN WATER,
Missouri Univ., Kansas City.
For primary bibliographic entry see Field 05A.
W73-08728

STANDARD POTENTIALS OF THE SILVER/SILVER-IODIDE ELECTRODE IN AQUEOUS MIXTURES OF ETHYLENE GLYCOL AT DIFFERENT TEMPERATURES AND THE THERMODYNAMICS OF TRANSFER OF HYDROGEN HALIDES FROM WATER TO GLYCOLIC MEDIA,
Jadavpur Univ., Calcutta (India). Dept. of Chemistry.
For primary bibliographic entry see Field 05A.
W73-08757

MOLECULAR ASPECTS OF AQUEOUS INTERFACIAL STRUCTURES,
Miami Univ., Coral Gables, Fla. Dept of Chemistry.
W. Drost-Hansen.
Journal of Geophysical Research, Vol 77, No 27, p 5132-5146, September 21, 1972. 10 fig, 48 ref.

Descriptors: *Air-water interfaces, *Water properties, *Surface tension, *Water structure, Thermodynamics, Evaporation, Sea water, Aqueous solutions, Water temperature, Water chemistry.

The structure of water at the interface between a solid and an aqueous phase is different from the structure of bulk water. Structural similarities have been found between water adjacent to a purely hydrophobic surface and water adjacent to a hydrophilic surface. In the presence of an insoluble monolayer on water, the vicinal water structure resembles the structure near a water-solid interface. Anomalies in the thermal properties of vicinal water are frequently observed and interpreted as higher order phase transitions in the structured entities at the interface. A notable anomaly in interfacial properties of water occurs at around 29 deg to 32 deg C. Assuming that natural seawater may be partially or completely covered by an insoluble monolayer, the sea-air interfacial properties may, therefore, also show an anomaly in this temperature range. The large surface entropy of vicinal water probably reflects an increase number of monomeric molecules. This anomaly is reflected both in the viscosity and the mechanical disjoining pressure of water between two solid surfaces and in the mechanical coupling between a solid surface and the vicinal water. This phenomenon may affect the rate of vaporization of seawater from a partially or completely covered air-sea interface. It is interesting to note that hurricanes appear to be spawned in the tropical ocean where the surface temperature exceeds approximately 30 deg C. A cause and effect relationship between this observation and the anomaly in surface entropy is suggested. (Knapp-USGS)
W73-08856

STABILITY OF ROTATIONAL COUETTE FLOW OF POLYMER SOLUTIONS,
Delaware Univ., Newark. Dept. of Chemical Engineering.
For primary bibliographic entry see Field 08B.
W73-09100

02. WATER CYCLE

2A. General

CHARACTERIZATION OF WATER MOVEMENT INTO AND THROUGH SOILS DURING AND IMMEDIATELY AFTER RAINSTORMS,
Kentucky Water Resources Inst., Lexington.
For primary bibliographic entry see Field 02G.
W73-08464

GROUNDWATER DEVELOPMENT AND ITS INFLUENCE ON THE WATER BALANCE,
Technical Univ., of Denmark, Copenhagen.
For primary bibliographic entry see Field 02F.
W73-08507

HIGH YIELD FROM THE BULL RUN WATERSHED,
British Columbia Dept. of Municipal Affairs, Victoria. Environmental Planning and Management Div.
L. V. Luchin.
Journal of the American Water Works Association, Vol 65, No 3, p 183-186, March 1973.

Descriptors: *Oregon, *Hydrologic cycle, *Evapotranspiration, *Hydrologic budget, Evaporation, Rainfall, Runoff, Soil water, Transpiration, Water balance, Water loss, Hydrologic data, Hydrologic aspects, Mathematical studies, Hydrologic equation, Discharge (Water), Hydrology, Water supply, Soil properties, Watersheds (Basins), Analytical techniques.

The Bull Run Watershed is located within the Mt. Hood National Forest about 25 miles east of Portland, Oregon. In order to determine whether water production is higher or lower than should be expected in the watershed, the magnitude of water loss to components of the hydrologic cycle must be measured. The actual discharge of the watershed is compared with computed yields. The hydrologic cycle is composed of such things as interception, evaporation, transpiration, and soil moisture storage. By utilizing a water balance technique, involving a balance sheet on which water use by the various hydrologic components is budgeted so that the amount of water entering a watershed is compared with the total amount discharged, it is possible to make reasonable estimates of the magnitude of water losses. Data required for computing the water balance are: (1) mean monthly watershed air temperature, (2) mean monthly watershed precipitation, (3) monthly actual and potential evapotranspiration loss, (4) monthly interception loss, (5) monthly evaporation loss, and (6) the amount of water held by the soil at field capacity. Using this technique, it was concluded that in the watershed the annual gross precipitation is greater than the annual water used, and the average annual water runoff is greater than that expected. Water loss constituting the greatest reduction of potential runoff occurred through evapotranspiration. (Adams-Florida)
W73-08667

HYDROGRAPH SIMULATION MODELS OF THE HILLSBOROUGH AND ALAFIA RIVERS, FLORIDA: A PRELIMINARY REPORT,
Geological Survey, Tampa, Fla.
For primary bibliographic entry see Field 04A.
W73-08733

EFFECTS OF COLUMBIA RIVER DISCHARGE ON CHLOROPHYLL A AND LIGHT ATTENUATION IN THE SEA,
Oregon State Univ., Corvallis. Dept. of Oceanography.
For primary bibliographic entry see Field 02L.
W73-08825

WORKING SYMPOSIUM ON SEA-AIR CHEMISTRY: SUMMARY AND RECOMMENDATIONS,
Rhode Island Univ., Kington. Graduate School of Oceanography.
For primary bibliographic entry see Field 02K.
W73-08850

STRUCTURE OF SEA WATER AND ITS ROLE IN CHEMICAL MASS TRANSPORT BETWEEN THE SEA AND THE ATMOSPHERE,
For primary bibliographic entry see Field 02K.
W73-08858

2B. Precipitation

ATMOSPHERIC EFFECTS ON OCEAN SURFACE TEMPERATURE SENSING FROM THE NOAA SATELLITE SCANNING RADIOMETER,
National Oceanic and Atmospheric Administration, Miami, Fla. Physical Oceanography Lab.
For primary bibliographic entry see Field 07B.
W73-08496

FILLING IN GAPS IN RAINFALL RECORDS BY SIMULATED DATA,
Food and Agriculture Organization of the United Nations, Iraklion (Greece). United Nations Development Programme.
B. Samuelsson.
Nordic Hydrology, Vol 4, No 1, p 17-27, 1973. 2 ref, 1 append.

Descriptors: *Simulation analysis, *Rainfall, Data processing, Statistics, Statistical methods, Data collections, Computer programs, Regression analysis, Synthetic hydrology.

The philosophy behind the generation of rainfall data is that historic rainfall records will never be repeated but that their statistical characteristics are preserved. This simulation should be based on historical records over a long enough period of time to include a sufficient number of extreme synoptic situations, in order to provide an acceptable overall statistical representation. The concept of the rainfall coincidence rate is introduced and is used as a tool for correcting the errors in the rainfall records which are due to shifts. The method of simulating missing rainfall data does not smooth the rainfall distribution pattern. Dates are allocated to the generated raindays according to a procedure which takes into account the coincidence rate as well as the occurrence of rainfall over groups of consecutive days. (Knapp-USGS)
W73-08506

THE ATMOSPHERIC EFFECTS OF THERMAL DISCHARGES INTO A LARGE LAKE,
Argonne National Lab., Ill.
For primary bibliographic entry see Field 05C.
W73-08623

THE INFLUENCE OF YEARLY WEATHER VARIATIONS ON SMOKE AND SULPHUR DIOXIDE POLLUTION IN PRETORIA,
National Physical Research Lab., Pretoria (South Africa).
For primary bibliographic entry see Field 05A.
W73-09038

INADVERTENT WEATHER AND PRECIPITATION MODIFICATION BY URBANIZATION,
Illinois State Water Survey, Urbana. Atmospheric Science Section.
For primary bibliographic entry see Field 04C.
W73-09077

2C. Snow, Ice, and Frost

SALINITY VARIATIONS IN SEA ICE,
Dartmouth Coll., Hanover, N.H. Dept. of Earth Sciences.
G. F. N. Cox, and W. F. Weeks.
In: AIDJEX Bulletin No 19, Washington University Division of Marine Resources, Seattle, p 1-17, March 1973. 11 fig, 1 tab, 13 ref.

Descriptors: *Sea ice, *Salinity, Topography, Brines, Water chemistry, Sampling, Cores, Regression analysis, Sea water.

The salinity distribution in multiyear sea ice is dependent on the ice topography and cannot be adequately represented by a single average profile. Cores collected from areas beneath surface hummocks generally show a systematic increase in salinity with depth from 0 at the surface to about 0.4 at the base. Cores collected from areas beneath surface depressions are much more saline with large salinity fluctuations. A strong correlation was found between the average salinity of the ice and the ice thickness. At 0.4 m the dominant brine drainage mechanism changes from brine expulsion to gravity drainage. An annual cyclic variation of the mean salinity probably exists for multiyear sea ice. The mean salinity should reach a maximum at the end of the growth season and a minimum at the end of the melt season. (Knapp-USGS)
W73-08474

1972 AIDJEX INTERIOR FLOW FIELD STUDY, PRELIMINARY REPORT AND COMPARISON WITH PREVIOUS RESULTS,
Washington Univ., Seattle. Dept. of Oceanography.
J. L. Newton, and L. K. Coachman.
In: AIDJEX Bulletin No 19, Washington University Division of Marine Resources, p 19-42, March 1973. 20 fig, 5 tab, 4 ref.

Descriptors: *Ocean currents, *Sea ice, *Arctic Ocean, Winds, Currents (Water), Drifting (Aquatic).
Identifiers: Ice drift, Wind shear.

The interior flow field of the Arctic Ocean was studied by making current and hydrographic measurements simultaneously in an array of fixed dimensions and by observing the ice motion and local weather conditions. The four-week average horizontal currents were in geostrophic balance. Both the four-week average and daily average sea surface slope values were directed approximately 90 deg to the left of the wind stress. As ice motion was within 30 deg of downwind, Coriolis acceleration generally opposed the horizontal pressure gradient force, and their magnitudes were nearly equal. A change in sea surface slope appeared to be generated in one to two days, and the currents at 500 m and 850 m responded directly to these changes. (Knapp-USGS)
W73-08475

MECHANICAL MODELS OF RIDGING IN THE ARCTIC SEA ICE COVER,
Washington Univ., Seattle. Dept. of Aeronautics and Astronautics.
R. R. Parmerter, and M. D. Coon.
In: AIDJEX Bulletin No 19, Washington University Division of Marine Resources, p 59-112, March 1973. 19 fig, 19 ref, 1 append. NSF Grant GV 28807.

Descriptors: *Sea ice, *Arctic Ocean, *Mathematical models, *Stress, *Strain, Computer programs, Deformation, Plastic deformation, Mechanical properties.
Identifiers: *Ice ridges.

In a kinematic model of the formation of pressure ridges in Arctic sea ice, the lateral and vertical motion of ice blocks is combined with a force balance and breaking stress calculation. A computer program encompassing several physical processes simulates ridge formation in ice with thickness from 20 cm to 2 m. Significant dimensionless parameters are identified, and parametric studies are presented of the functional relationships between these parameters. The maximum height, crack location, and required force are functions of the mechanical and geometrical properties of the ice sheet. Typically a force increase of two orders of magnitude is required to make the transition from building a ridge from frozen ice in leads to building it from the parent ice sheet. The large forces are toward the upperend of the range of forces available, in agreement with the observation that most ridges are built from thin iceblocks. When large forces are available and the parent ice is fractured, ridges of limited height but unlimited lateral extent can occur. These correspond to the rubble fields which are occasionally observed. The proposed models agree with observational knowledge and provide predictions which can be tested by field experiments. (Knapp-USGS)
W73-08476

ICEBERGS AS A FRESH WATER SOURCE: AN APPRAISAL,
Cold Regions Research and Engineering Lab., Hanover, N.H.
W. F. Weeks, and W. J. Campbell.
Research Report 200, January 1973. 22 p, 16 fig, 1 tab, 24 ref.

Descriptors: *Icebergs, *Antarctic, *Water supply, South America, Australia, Navigation, Water resources.

The idea of transporting large icebergs to arid regions to provide a fresh water source is reviewed. Only in the Antarctic are supplies of large tabular icebergs available. Data on the size distribution of these icebergs are reviewed, and it is concluded that icebergs of almost any desired size can readily be located. Steady-state towing velocities of different sized icebergs are calculated based on estimates of the drag of the icebergs and pull of tugs. Because drag increases with velocity squared, large icebergs can be towed only at very slow velocities. However, tugs that can be built within the capabilities of current technology are capable of towing extremely large icebergs. Although melting losses are significant and may be excessive for small icebergs, when large icebergs are towed large amounts of ice are left when the iceberg arrives at its destination. Towing trajectories, travel times, and ice delivery rates are calculated for optimum routes between the Amery Ice Shelf and Western Australia and the Ross Ice Shelf and the Atacama Desert. Transit times exceed 107 and 145 days, respectively, with over 50% of the initial ice delivered. After total towing charges are paid, it is possible to deliver ice to Western Australia for 1.3 mills/cu m of water and to the Atacama Desert region for 1.9 mills/cu m. The water delivered by the operation of one super tug alone would irrigate 16,000 sq km. (Knapp-USGS)
W73-08478

AVALANCHES IN SOVIET CENTRAL ASIA (LAVINY SREDNEY AZII).
Sredneaziatskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Tashketn (USSR).

Sredneaziatskiy Nauchno-Issledovatel'skiy Gidrometeorologicheskiy Institut Trudy, No 63 (78), Leningrad, Yu. D. Moskalev, editor, 1972. 137 p.

Descriptors: *Avalanches, *Snow, *Snow cover, *Meteorology, *Topography, Mountains, Slopes, Snowfall, Precipitation (Atmospheric), Temperature, Winds, Synoptic analysis, Crystallography, Ice, Properties, Explosions, Analytical techniques, Forecasting, Seasonal, Equations.
Identifiers: *Soviet Central Asia, *Kazakhstan, *Tien Shan Mountains, Avalanche release, Avalanche hazard, Avalanche control, Snow properties, Snow depth.

Snow and avalanche formations in Soviet Central Asia and Kazakhstan, and avalanche forecasting and control techniques were investigated in this collection of 12 papers prepared by workers at the Central Asian Hydrometeorological Research Institute in Tashkent. The titles of the papers are: (1) mechanism of avalanche formation associated with snowfalls and snowstorms; (2) forms of avalanche release and movement; (3) analysis of present methods of avalanche-hazard evaluation; (4) techniques of avalanche forecasting; (5) quantitative estimates of avalanche formation in Western Tien Shan; (6) snow-avalanche parameters in connection with intentional avalanching and calculation of avalanche motion; (7) some physical properties of newly fallen snow in Western Tien Shan; (8) some observations of avalanching; (9) avalanche formation in Western Tien Shan during large snowfalls in the winter of 1968-69; (10) development of snow transformation processes in the complex mountain zone of Western Tien Shan; (11) methods of anticipating avalanche hazard from rainfall and snowfall intensities in mountains of Zailiski Ala Tau; and (12) redistribution of snow by winds in a mountainous terrain. (See W73-08481 thru W73-08490) (Josefson-USGS)
W73-08480

MECHANISM OF AVALANCHE FORMATION ASSOCIATED WITH SNOWFALLS AND SNOWSTORMS (O MEKHANIZME VOZNIKNOVENIYA LAVIN, SVYAZANNYKH SO SNEGOPADAMI I METELYAMI),
Sredneaziatskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Tashkent (USSR).
K. S. Losev.
In: Laviny Sredney Azii; Sredneaziatskiy Nauchno-Issledovatel'skiy Gidrometeorologicheskiy Institut Trudy, No 63 (78), p 3-11, Leningrad, 1972. 1 fig, 3 tab, 14 ref.

Descriptors: *Avalanches, *Snow, *Snow cover, *Snowfall, *Storms, Winds, Crystallography, Cohesion, Physical properties, Temperature, Forecasting.
Identifiers: *USSR, *Snowstorms, Snow crystals, Snow properties, Slab avalanches, Snow slabs, Wind slabs, Avalanche hazard.

Snow avalanche origin should be studied from the standpoint of snow crystals, since their original form determines the cohesion of newly deposited snow. The factors which influence cohesion of snow cover are type and density of snow crystals, temperature, and wind. Relation of the mechanism of avalanche origin to cohesiveness of newly deposited snow is examined, and recommendations are made for describing cohesiveness of avalanche-forming snow slabs on the basis of genetic, age, and crystallographic characteristics. Additional studies are required of crystallographic properties of deposited snow and of its structural changes in time and after snow deposition; also, a reexamination is needed of methods to determine the end of an avalanche-hazard period in empirical avalanche-forecasting procedures. (See also W73-08480) (Josefson-USGS)
W73-08481

FORMS OF AVALANCHE RELEASE AND MOVEMENT (O FORMAKH OBRUSHENIYA I DVIZHENIYA LAVIN),
Sredneaziatskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Tashkent (USSR).
Yu. D. Moskalev.
In: Laviny Sredney Azii; Sredneaziatskiy Nauchno-Issledovatel'skiy Gidrometeorologicheskiy Institut Trudy, No 63 (78), p 12-17, Leningrad, 1972. 1 tab, 25 ref.

Descriptors: *Avalanches, *Movement, *Snow, Ice, Mechanical properties, Stability, Loads (Forces), Stress, Tension, Deformation, Slopes, Sound waves, Seismic waves, Velocity.
Identifiers: *USSR, *Avalanche release, Snow properties, Snow structure, Snow density, Snow slabs, Shock waves.

Possible mechanisms of avalanche release were investigated in case examples of (1) damp or wet snow over dry snow; (2) dry, loose snow; (3) low-density, newly fallen snow; (4) snow slabs; (5) plastic snow; and (6) wet snow. Depending upon snow properties, avalanches may move as (1) a cloud of aerosol behaving as a body of dense gas; (2) a slide of loose snow; (3) a mixture of snow-slab debris; (4) a mixture of damp loose or compressed snow chunks; (5) a consolidated plastic snow mass; or (6) a turbulent slide of water-saturated snow. The role of fluidization of the snow mass is discussed together with the importance of hydrodynamic (air or water) lubrication during avalanching. Also examined are (1) possible formation of air waves during avalanche motion due to vibrational processes in the avalanche and to its wave guide properties and (2) possible formation of a shock wave ahead of an avalanche front caused by passage of longitudinal waves (hypothetically subsonic) across the leading edge of the avalanche. (See also W73-08480) (Josefson-USGS)
W73-08482

QUANTITATIVE ESTIMATES OF AVALANCHE FORMATION IN WESTERN TIEN SHAN (K KOLICHESTVENNOY OTSENKE LAVINOBRAZOVANIYA V ZAPADNOM TYAN'-SHANE),
Sredneaziatskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Tashkent (USSR).
L. A. Kanayev.
In: Laviny Sredney Azii; Sredneaziatskiy Nauchno-Issledovatel'skiy Gidrometeorologicheskiy Institut Trudy, No 63 (78), p 41-47, Leningrad, 1972. 2 tab, 8 ref.

Descriptors: *Avalanches, *Snow, *Snow cover, *Mountains, *River basins, Valleys, Vegetation, Topography, Topographic mapping, Maps, Estimating.
Identifiers: *USSR, *Tein Shan Mountains, Avalanche hazard.

Investigation of the intensity of snow-avalanche activity in mountain basins was based on data tabulated from a 1:300,000-scale topographic map of Western Tien Shan, prepared by the Uzbek Administration of the Hydrometeorological Service. To best describe intensity of avalanche formation, maps on a scale of 1:100,000 to 1:500,000 should be used. Avalanche density for the Pskem, Ugam, Chatkal, and Angren River basins was based on the tabulated number of avalanches per kilometer of valley length. Depending upon relief and vegetation, mountain river basins may be grouped according to avalanche hazard into five classes as (1) very high, (2) high, (3) moderate, (4) slight, and (5) none. (See also W73-08480) (Josefson-USGS)
W73-08483

SNOW-AVALANCHE PARAMETERS IN CONNECTION WITH INTENTIONAL AVALANCHING AND CALCULATION OF AVALANCHE MOTION (O SNEGOLAVINNYKH PARAMETRAKH V SVYAZI S AKTIVNYMI VOZDEYSTVIYAMI NA SKHOD LAVIN I RASCHETEMI IKH DVIZHENIYA),
Sredneaziatskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Tashkent (USSR).
Yu. D. Moskalev, and M. K. Yefimov.
In: Laviny Sredney Azii; Sredneaziatskiy Nauchno-Issledovatel'skiy Gidrometeorologicheskiy Institut Trudy, No 63 (78), p 48-61, Leningrad, 1972. 4 fig, 3 tab, 13 ref.

Descriptors: *Avalanches, *Snow, *Movement, *Topography, *Properties, Physical properties, Mechanical properties, Stability, Stress, Deformation, Cohesion, Explosions, Explosives, Seismic waves, Regions, Equations.
Identifiers: *USSR, *Soviet Central Asia, *Tien Shan Mountains, *Avalanche release, Avalanche hazard, Avalanche control, Snow slabs.

The most effective method of avalanche control in avalanche-hazard regions of Western Tien Shan is artificial release by detonation of explosives. To relieve mountain slopes of unstable snow, 20-30 kg of ammonite is usually considered a sufficiently reliable charge. An air wave caused by blasting with high explosives can initiate avalanches of newly fallen snow. Avalanches can be triggered by explosives when the coefficients of snow stability are greater than 1; if the coefficients are greater than 3 or 4, the use of explosives is not always successful. Data on physico-mechanical properties of snow during artificial release in Western Tien Shan are tabulated together with data on maximum distance of flowage of avalanches in the Khibiny Mountains and Soviet Central Asia. (See also W73-08480) (Josefson-USGS)
W73-08484

SOME PHYSICAL PROPERTIES OF NEWLY FALLEN SNOW IN WESTERN TIEN SHAN (NEKOTORYYE FIZICHESKIYE SVOYSTVA SVEZHEVYPAVSHEGO SNEGA V ZAPADNOM TYAN'-SHANE),
Sredneaziatskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Tashkent (USSR).
G. G. Kharitonov.
In: Laviny Sredney Azii; Sredneaziatskiy Nauchno-Issledovatel'skiy Gidrometeorologicheskiy Institut Trudy, No 63 (78), p 62-79, Leningrad, 1972. 6 fig, 3 tab, 6 ref.

Descriptors: *Snow, *Snowfall, *Mountains, *Physical properties, Avalanches, Density, Temperature, Air temperature, Thermocline, Cohesion, Mechanical properties, Measurement, Curves.
Identifiers: *USSR, *Tien Shan Mountains, *Snow properties, Snow stability, Snow crystals.

Density, temperature, and ultimate cohesive strength of newly fallen snow in mountains of Western Tien Shan were investigated in detailed studies carried out at the Naugarzan, Kyzylcha, and Dukant snow-avalanche stations of the Uzbek Administration of the Hydrometeorological Service in 1960-67. To eliminate random errors, measurements of cohesive strength were replicated 20-22 times. At a constant air temperature between two successive periods of observations, cohesion of snow increased by an average of 16.2 kg/sq m. A relation was constructed between the gain in cohesion for each degree of temperature change and negative air temperature. Termination of snowfall and presence of sufficiently high (more than 0.1 deg/cm) temperature gradients in a layer of newly fallen snow are considered basic indicators of the loss of cohesion during periods of reduced air temperatures. Using the methods described, ultimate cohesive strength of newly fallen snow can be computed on the basis of snow density and air temperature data. (See also W73-08480) (Josefson-USGS)
W73-08485

SOME OBSERVATIONS OF AVALANCHING (NEKOTORYYE NABLYUDENIYA NAD SKHODOM LAVIN),
Sredneaziatskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Tashkent (USSR).
A. I. Korolev.
In: Laviny Sredney Azii; Sredneaziatskiy Nauchno-Issledovatel'skiy Gidrometeorologicheskiy Institut Trudy, No 63 (78), p 80-88, Leningrad, 1972. 1 tab, 4 ref.

Descriptors: *Avalanches, *Snow, *Snowfall, *Movement, *Meteorology, Slopes, Cracks, Explosives, Explosions, Roads, Snow removal, Winter.
Identifiers: *USSR, Avalanche release, Avalanche hazard, Avalanche control, Avalanche fracture lines, Snow properties, Snow slabs.

Freezing weather and large snowfalls in the winter of 1968-69 created a serious avalanche hazard in January in the region of the Dukant snow-avalanche station of the Uzbek Administration of the Hydrometeorological Service. Results are presented of a number of avalanche-control measures undertaken to effect artificial release of snow on slopes by the detonation of explosives. (See also W73-08480) (Josefson-USGS)
W73-08486

AVALANCHE FORMATION IN WESTERN TIEN SHAN DURING LARGE SNOWFALLS IN THE WINTER OF 1968-69 (USLOVIYA LAVINOOBRAZOVANIYA V MNOGOSNEZHNUYU ZIMU 1968/69 G. V ZAPADNOM TYAN'-SHANE).
Sredneaziatskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Tashkent (USSR).
M. K. Yefimov.
In: Laviny Sredney Azii; Sredneaziatskiy Nauchno-Issledovatel'skiy Gidrometeorologicheskiy Institut Trudy, No 63 (78), p 89-95, Leningrad, 1972. 1 tab, 8 ref.

Descriptors: *Avalanches, *Snow, *Snowpacks, *Snowfall, *Mountains, Slopes, Meteorology, Anticyclones, Cyclones, Precipitation (Atmospheric), Air temperature, Synoptic analysis, Forecasting, Seasonal, Winter.
Identifiers: *USSR, *Tien Shan Mountains, *Soviet Central Asia, *Kazakhstan, Avalanche release, Avalanche hazard, Snowslides, Snow slabs.

The winter of 1968-69 in Western Tien Shan was characterized by very low air temperatures, exceptionally heavy precipitation, thick snow cover, and intense avalanche activity. Average November-April air temperature in regions of snow-avalanche stations of the Uzbek Administration of the Hydrometeorological Service was minus 3.2 deg C, or 2.1 deg C lower than the long-term average. Precipitation at snow-avalanche stations for November-April varied between 1,300 and 1,500 mm, which was twice the normal precipitation (668 mm) for this period. Snow depth at meteorological plots of the Dukant and Kyzylcha stations reached 242 and 325 cm, respectively. Over 290 avalanches were recorded in the vicinity of the Dukant station, 125 avalanches at the Kyzylcha station, and about 400 avalanches and snowslides in the Naugarzan and Aktash River basins. Avalanching occurred at almost all stations at the same time. The avalanche danger which existed in the winter of 1968-69 arose from intrusions of cold arctic air, wave activity on the polar front, and especially from inrush of southern cyclones into mountainous areas of Soviet Central Asia and Kazakhstan. Provided snow conditions on mountain slopes of different exposure are known, background forecasts of the advent of avalanche-hazard periods can be prepared. (See also W73-08480) (Josefson-USGS)
W73-08487

DEVELOPMENT OF SNOW TRANSFORMATION PROCESSES IN THE COMPLEX MOUNTAIN ZONE OF WESTERN TIEN SHAN (OPYT INDIKATSII PROTSESSOV PREOBRAZOVANIYA SNEGA V SREDNEGORNOY ZONE ZAPADNOGO TYAN'-SHANYA),
Sredneaziatskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Tashkent (USSR).
L. A. Kanayev.

In: Laviny Sredney Azii; Sredneaziatskiy Nauchno-Issledovatel'skiy Gidrometeorologicheskiy Institut Trudy, No 63 (78), p 96-103, Leningrad, 1972. 2 tab, 5 ref.

Descriptors: *Snow, *Snow cover, *Snowfall, *Mountains, *Meteorology, Cyclones, Anticyclones, Synoptic analysis, Weather data, Temperature, Air temperature, Thermocline, Sublimation, Slopes, Valleys, Profiles, Forecasting, Winter.
Identifiers: *USSR, *Tien Shan Mountains, *Complex mountains, Avalanche release, Snow metamorphism.

Observations of snow temperature and stratigraphy were made in 1958-71 in river valleys of the Dukant (elevation--1,500 to 2,100 m) and Kyzylcha (elevation--2,100 to 2,700 m) snow-avalanche stations in the Akhangaran River basin in Western Tien Shan. Based on an analysis of stratigraphic profiles, two types of snow-layer development were distinguished: syngenetic and episyngenetic. A relation was established between the two types of development and the meteorological conditions during a winter period before January 1. A classification of these meteorological conditions can be used to forecast development of a snow layer and possibility of avalanche movement of a particular snow type. (See also W73-08480) (Josefson-USGS)
W73-08488

METHODS OF ANTICIPATING AVALANCHE HAZARD FROM RAINFALL AND SNOWFALL INTENSITIES IN MOUNTAINS OF ZAILISKI ALA TAU (SPOSOBY PROGNOZA LAVINNOY OPASNOSTI PO INTENSIVNOSTI OSADKOV I SNEGOPADOV V GORAKH ZAILIYSKOGO ALATAU),
Sredneaziatskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Tashkent (USSR).
Ye. I. Kolesnikov.
In: Laviny Sredney Azii; Sredneaziatskiy Nauchno-Issledovatel'skiy Gidrometeorologicheskiy Institut Trudy, No 63 (78), p 104-121, Leningrad, 1972. 7 fig, 7 tab, 7 ref.

Descriptors: *Avalanches, *Precipitation intensity, *Rainfall intensity, *Snowfall, *Mountains, Snowpacks, Slopes, River basins, Meteorology, Precipitation (Atmospheric), Humidity, Physical properties, Mechanical properties, Analytical techniques, Curves, Equations, Forecasting, Winter.
Identifiers: *USSR, *Zailiski Ala Tau, *Avalanche hazard, *Snowfall intensity, Avalanche release, Snow stratigraphy.

Investigations of avalanche formation in mountains of Zailiski Ala Tau and of quantitative indicators of developing avalanche hazard during snowfalls were based on observations of snow stratigraphy and physico-mechanical properties and of avalanche movement in the Bol'shaya Almatinka and Malaya Almatinka River basins in the winters of 1966-69. Avalanche activity is greatest in the complex mountain zone on slope angles between 30 and 40 deg at elevations of 1,600 to 3,000 m. Avalanche-forecasting techniques already employed in other parts of the country are examined for possible application in the Tien Shan mountain system. Individual avalanche-forming factors (snow depth, amount and intensity of precipitation) are compared with the time a given slope will avalanche, the release being associated with precipitation in over 70% of the cases. Average difference between computed and actual time of avalanching is plus or minus 0.75-0.85 hrs, and avalanche-hazard is predictable in 94%-95% of the cases. (See also W73-08480) (Josefson-USGS)
W73-08489

REDISTRIBUTION OF SNOW BY WINDS IN A MOUNTAINOUS TERRAIN (PERERASPREDELENIYE SNEZHNOGO POKROVA METELYAMI V USLOVIYAKH GORNOGO REL'YEFA),
Sredneaziatskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Tashkent (USSR).
B. I. Novikov.
In: Laviny Sredney Azii; Sredneaziatskiy Nauchno-Issledovatel'skiy Gidrometeorologicheskiy Institut Trudy, No 63 (78), p 122-131, Leningrad, 1972. 2 fig, 4 tab, 6 ref, append.

Descriptors: *Snow, *Snowpacks, *Snow cover, *Winds, *Mountains, Slopes, Vegetation, Topography, Meteorology, Snowfall, Precipitation (Atmospheric), Avalanches, Curves, Equations, Forecasting.
Identifiers: *USSR, *Carpathian Mountains, *Snowstorms, Snow depth.

Snow accumulation was investigated under various conditions of topography in a mountainous region of the Carpathians in 1966-70. Observations of snow cover were carried out at 16 plots on slopes of different exposure and steepness at elevations of 1,400 to 1,800 m. The amount of snow accumulated in individual areas in winter can best be described by coefficients which relate average or maximum snow depths to similar snow-depth values at a standard plot. The coefficient of snow accumulation for plots on leeward slopes increases with increasing slope angle. Relations are established between increase in snow depth on leeward slopes and amount of precipitation occurring during or immediately before a snowstorm. The empirical relations obtained can be used to determine avalanche activity on slopes of different exposure from the total accumulated depth of snowfall and to calculate incipient avalanching of wind-driven snow from the amount of snow accumulated during a single snowstorm. (See also W73-08480) (Josefson-USGS)
W73-08490

SNOW-WATER EQUIVALENT MEASUREMENT USING NATURAL GAMMA EMISSION,
Geological Survey of Canada, Ottawa (Ontario).
R. L. Grasty.
Nordic Hydrology, Vol 4, No 1, p 1-16, 1973. 5 fig, 4 tab, 13 ref.

Descriptors: *Remote sensing, *Snow surveys, *Snowpacks, *Water equivalent, *Gamma rays, Nuclear moisture meters, Instrumentation, Calibrations, Canada.
Identifiers: *Gamma-ray spectrometers.

The natural gamma radiation emitted by potassium, uranium and thorium is attenuated by snow. This attenuation depends on the water-equivalent of the snow layer. With an airborne gamma-ray spectrometer, snow water-equivalents up to 18 cm could be measured to an accuracy of 2 cm over suitable terrain. The effects of temperature and soil moisture corrections are discussed, together with statistical, instrumental and navigational errors. (Knapp-USGS)
W73-08505

PHOTOSYNTHESIS AND RESPIRATION OF SOME ARCTIC SEAWEEDS,
Scripps Institution of Oceanography, La Jolla, Calif.
For primary bibliographic entry see Field 05C.
W73-08585

THE SNOW REMOVAL CONTROVERSY,
Toronto Univ. (Ontario). Inst. of Environmental Sciences and Engineering.
For primary bibliographic entry see Field 05B.
W73-08601

A SURVEY OF LENTIC WATER WITH RESPECT TO DISSOLVED AND PARTICULATE LEAD,
Alaska Univ., College. Inst. of Water Resources.
For primary bibliographic entry see Field 05B.
W73-08604

GLACIERS AND NUTRIENTS IN ARCTIC SEAS,
Maine Dept. of Sea and Shore Fisheries, West Boothbay Harbor. Fisheries Research Station.
For primary bibliographic entry see Field 02K.
W73-08726

EFFECT OF GROUNDWATER ON STABILITY OF SLOPES AND STRUCTURES ERECTED ON THEM ON THAWING OF FROZEN SOILS,
V. S. Savel'yev.
Available from NTIS, Springfield, Va 22151 as AD-750 600, Price $3.00 printed copy; $1.45 microfiche. Army Cold Regions Research and Engineering Laboratory Draft Translation TL 369, October 1972. 10 p, 1 fig, 3 ref. (Translated from Trudy Pvatogo Soveshchaniya-seminara po Obmenu Opytom Stroitel'stva v Surovykh Klimaticheskikh Usloviyakh, Vol 7, No 1, p 207-219, 1968.)

Descriptors: *Slope stability, *Soil erosion, *Snowmelt, *Surface runoff, *Mudflows, Cold regions, Ice, Thawing, Frozen ground, Soil properties, Data collections, Methodology, Evaluation.
Identifiers: *USSR (Chukotka).

For many years investigations have been made of the stability of soil masses and structures on the solifluction slopes of Chukotka in northeast Russia. It has been established that the stability reserve coefficient of the thawed layer can in no way be determined on the basis of only the physiocomechanical properties and displacement parameters of the soils. To a considerable extent, the stability of soil masses is determined by their filtration qualities and specific conditions of slope flooding caused by the freeze-thaw cycles. The stability of the seasonally thawed layer on the slopes, formed of silty sands and sandy loams, is usually disrupted during prolonged rains. The loams and clays start to move even without atmospheric precipitation, owing to the groundwater forming during thawing of interbeddings of segregated ice. The typical conditions for the stability of wet soils lying on the surface of frozen ground are examined. (Woodard-USGS)
W73-08734

TURF HUMMOCKS IN THE LOWER COURSE OF THE INDIGIRKA RIVER,
Akademiya Nauk SSSR, Yakutsk. Institut Merzlotovedeniya.
A. N. Tolstov.
Available from NTIS, Springfield, Va 22151 as AD-742 218 Price $3.00 printed copy; $1.45 microfiche. Army Cold Regions Research and Engineering Laboratory Draft Translation TL 350, May 1972. 8 p, 2 fig, 7 ref. (Translation of paper by Akademiya Nauk USSR, Izdatel' stvo, p 123-127, 1962)

Descriptors: *Uplift pressure, *Ice, *Turf, *Hydrostatic pressure, *Rivers, Reservoirs, Heaving, Soils, Sediments, Mosses, Data collections.
Identifiers: *Indigirka River (USSR), Turf hummocks.

Turf hummocks in the lower course of the Indigirka River, USSR, have a slight distribution and belong to two types: (1) without an ice core, and (2) with an ice core. The formation of a turf hummock without an ice core occurred due to the inflow of water from a small lake located at the base, and owing to the subsequent development of hydrostatic pressure at this place. The latter condition

led to heaving and overstressing in the superjacent turf layers, having been subjected chiefly to disruption and deformation in the southern part of the hummock. The ice streaks having formed in this part raised the earth's surface. However, in the northern part, there occurred a partial settling of the earth's surface; as a result, the individual turf clods became buried under pulverized silty loam. The formation of turf hummocks with an ice core is also explained in terms of hydrostatic pressure, having originated during the freezing of water in the reservoir. The water proved to be in a closed space; as a result, there occurred the upheaval of the turfy reservoir bottom overgrown with sphagnum. (Woodard-USGS)
W73-08735

GREAT LAKES ICE COVER, WINTER 1969-70,
National Ocean Survey, Detroit, Mich. Lake Survey Center.
D. R. Rondy.
Available from NTIS, Springfield, Va 22151 as COM-72-10917; Price $3.00 printed copy; $1.45 microfiche. Technical Memorandum NOS LSC D-3, March 1972. 56 p, 40 plate, 1 tab.

Descriptors: *Ice cover, *Great lakes, *Iced lakes, Winter, Data collections, Aircraft, Ice loads, Lake ice, Freezing, Melting, Snow, Ice-water interfaces, Time, Seasonal.

Thirty-three ice charts were produced from data obtained on 14 visual aerial reconnaissance flights over the Great Lakes during the 1969-70 ice season. Winter temperatures were below normal and were determined from freezing degree-day accumulations. Reported dates of first ice varied from November 3,1969, on southern Lake Huron to December 23, 1969, on eastern Lake Ontario. The period of maximum ice cover varied across the Great Lakes, as did the areal extent of the ice cover. During the periods of maximum ice extent, Lake Superior was estimated to the 85% covered, with a particularly heavy concentration of winter ice in the southeastern portion; Lake Michigan 30% covered, with heavy winter ice confined to the northern end of the lake; Lake Huron 50% covered with differing concentrations around the lake; Lake Erie 95% covered with most of the winter ice containing a drifted snow cover; and Lake Ontario 15% covered with the major concentrations located in the approaches to the St. Lawrence River. The reported dates of last ice ranged from March 31 on eastern Lake Ontario to April 27 on eastern Lake Superior. (Woodard-USGS)
W73-08743

FREEZING EFFECTS ON ARCTIC BEACHES,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
A. D. Short, and W. J. Wiseman, Jr.
Available from NTIS, Springfield, Va. 22151, as AD-755 153. Price $3.00 printed copy; $1.45 microfiche. Louisiana State University Coastal Studies Bulletin No 7, p 23-32, Technical Report 128, January 1973. 6 fig, 4 ref.

Descriptors: *Beaches, *Arctic, *Freezing, *Thawing, *Sedimentation, Waves (Water), Erosion, Beach erosion, Stratigraphy, Ice, Snow, Topography, Geomorphology, Sands, Gravels, Sedimentology, Frost action.
Identifiers: *Arctic beaches.

Freezeup on arctic beaches is accompanied by subzero air and water temperatures, which freeze both swash and sediment. Ice in nearshore waters may be deposited on the beach and preserved. Snow may also be preserved in the beach. Beaches with wave activity during the freezeup process contain interbedded snow, frozen swash, ice boulders, and sediment. With spring thaw, the encased ice melts, causing superimposition of the overlying layers and increased deformation of the layers toward the surface. The result is an upper zone (approximately 1.5 meters thick) containing normal beach stratigraphy in addition to irregular, mottled, and complex interbedding, often with lenses, pods, and stringers of sand and gravel. Within the section erosional contacts intersect these beds and occasionally intersect kettle holes and runnels filled with eolian and deformed swash deposits. (Knapp-USGS)
W73-08751

VARIATION IN IONIC RATIOS BETWEEN REFERENCE SEA WATER AND MARINE AEROSOLS,
Centre National de la Recherche Scientifique, Gif-sur-Yvette (France). Centre des Faibles Radioactivites.
For primary bibliographic entry see Field 02K.
W73-08855

CHARACTERISTICS OF HUMMOCKS IN FAST ICE (KHARAKTERISTIKA TOROSOV V PRIPAYE),
Moscow State Univ. (USSR).
V. M. Klimovich.
Meteorologiya i Gidrologiya, No 5, p 80-87, May 1972. 3 fig, 5 tab, 4 ref.

Descriptors: *Sea ice, *Arctic, *Shores, Coasts, Littoral, Winds, Measurement, Height, Spring, Statistical methods, Curves, Equations.
Identifiers: *USSR, *Ice hummocks, *Fast ice, Ice floes, Ice thickness, Icebreakers, Factor analysis.

Height of hummocks and thickness of hummocky floes were measured in an Arctic region of fast ice in the springs of 1962-65. The height distribution of hummocks obeys Maxwell's law of distribution. The amount of hummocked ice and the hummock height are determined by the period of formation of fast ice and by wind conditions. (Josefson-USGS)
W73-08884

VARIATIONS IN SALINITY DURING FORMATION OF ICE IN SHALLOW SEAS (IZMENENIYE SOLENOSTI VODY PRI OBRAZOVANII L'DA VA MELKOVODNYKH MORYAKH),
State Oceanographic Inst., Moscow (USSR).
L. O. Kuzenkova.
Meteorologiya i Gidrologiya, No 5, p 75-79, May 1972. 1 fig, 1 tab, 4 ref.

Descriptors: *Salinity, *Ice, *Shallow water, *Depth, *Variability, Winter, Seasonal, Equations.
Identifiers: *USSR, Ice thickness, Nomograms.

An empirical method for computing salinity in shallow water in winter is based on increase in salinity resulting from changes in water volume during formation of ice. The thickness of ice is considered in relation to the depth of the body of water in which it is formed. Variations in salinity are inversely proportional to the changes in depth of the water body and directly proportional to the changes in ice thickness. (Josefson-USGS)
W73-08885

ICE JAMS IN THE DANUBE DELTA AND SOME MEASURES TO PREVENT FLOODS CAUSED BY THEM (ZATORY L'DA V DEL'TE DUNAYA I NEKOTORYYE MEROPRIYATIYA PO PREDOTVRASHCHENIYU VYZYVAYEMYKH IMI NAVODNENIY),
Vsesoyuznyi Nauchno-Issledovateskii Institut Gidrotekhniki, Leningrad (USSR).
For primary bibliographic entry see Field 04A.
W73-08886

THE ECOLOGY OF SOME ARCTIC TUNDRA PONDS,
Missouri Univ., Columbia.
For primary bibliographic entry see Field 05C.
W73-08909

GLAZE AND RIME PHENOMENA AND ICING OF WIRES IN SOVIET CENTRAL ASIA (GOLOLEDNO-IZMOROZEVYYE YAVLENIYA I OBLEDENENIYE PROVODOV V SREDNEY AZII),
Srednеaziatskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Tashkent (USSR).
G. N. Leukhina.
Trudy, No 7 (88), Leningrad, 1972. 144p.

Descriptors: *Meteorology, *Sleet, *Ice, *Rime, *Transmission lines, Ice loads, Snow, Air temperature, Wind velocity, Synoptic analysis, Topography, Orography, Spatial distribution, Temporal distribution, Variability, Maps.
Identifiers: *USSR, *Soviet Central Asia, *Glaze (Ice), Ice damage.

Investigations of glaze (sleet) and rime phenomena and icing of wires were based on visual and instrument observations carried out at 285 hydrometeorological stations in Soviet Central Asia in 1936-69. The study included the different types and duration of ice formation on wires; space-time distribution of glaze, rime, and wet snow; meteorological and synoptic conditions of glaze formation; formation of especially dangerous ice deposits; and ice loads in transmission lines. Maps were constructed which show space-time variability of the different forms of precipitation. (Josefson-USGS)
W73-08999

DEEP ROTARY CORE DRILLING IN ICE,
Cold Regions Research and Engineering Lab., Hanover, N.H.
G. R. Lange.
Technical Report 94, February 1973. 46 p, 22 fig, 1 tab, 33 ref, 3 append.

Descriptors: *Ice, *Core drilling, *Drilling fluids, *Glaciers, *Polar regions, Glaciology, Equipment, Methodology, Temperature, Depth, Rotary drilling, Drilling samples.
Identifiers: Deep core drilling.

A method of drilling holes and obtaining core to depths of 1500 ft in high polar glaciers was required for International Geophysical Year (IGY) glaciological investigations. Rotary drilling equipment was modified and sent to Greenland and the Antarctic. Principal modifications included the use of chilled compressed air as a circulating fluid and specially designed coring bits. During initial trials in northwest Greenland in 1956 nearly continuous core was obtained to 970 ft but the core was badly cracked at depth. A second season in Greenland produced much more continuous core to 1000 ft, and single coring runs at the 1100-, 1200- and 1300-ft levels produced usable core. Core cracking at depth persisted although it was less severe. During the Antarctic field season of 1957-58 similar equipment was used to take continuous core to 1000 ft at Byrd Station for the IGY glaciological program. The use of a special constant rate of feed device for coring and improved techniques based on experience gained in Greenland resulted in further improvements in core condition and rate of recovery. In 1957-58 the Ross Ice Shelf was penetrated 840 ft at Little America V with equally good results. One core taken with diesel fuel at the bottom of the ice shelf was remarkably free from the cracking which had previously resulted from the rapid release of overburden load in the empty hole. This strongly suggests that increased depths and much better core will be obtained if diesel fuel is used as the circulating fluid. Coring to depths of 10,000 ft should be possible with much heavier ro-

tary drilling equipment and similar techniques, but logistic and other considerations suggest that the feasibility of a wire line method rather than drill pipe be investigated. (Woodard-USGS)
W73-09079

CYCLIC SURGING OF GLACIERS,
Scott Polar Research Inst., Cambridge (England).
G. de Q. Robin, and J. Weertman.
Journal of Glaciology, Vol 12, No 64, p 3-18, 1973. 8 fig, 25 ref.

Descriptors: *Glaciers, *Movement, *Melt water, Regimen, Equations, Rheology, Cryology, Ice, Mathematical studies.
Identifiers: *Surging glaciers, *Glacial surges.

A theory and model are proposed to explain cyclically surging glaciers. During the after-surge portion of a surge cycle the lower portion of a glacier becomes increasingly stagnant. The upper part of the glacier gradually becomes more active as both its thickness and the magnitude of its basal shear stress increase. In the region between these two parts (the trigger zone), the value of the derivative of the basal shear stress in the longitudinal direction of the glacier gradually increases with time. The pressure gradient in the water at the base of a glacier is related to the derivative of the basal shear stress. The pressure gradient decreases as the basal shear-stress gradient increases. The pressure gradient actually cantake on negative values, a condition which produces 'up-hill' water flow at the base of a glacier. A surge is started in the trigger zone when water is dammed there by a zero water-pressure gradient. The zone of fast-sliding velocities propagates up the glacier from the trigger zone with a velocity of the order of a surge velocity. The fast-sliding velocity zone also propagates down the glacier because of increased melt-water production. (Knapp-USGS)
W73-09086

INVERSION OF FLOW MEASUREMENTS FOR STRESS AND RHEOLOGICAL PARAMETERS IN A VALLEY GLACIER,
California Inst., of Tech., Pasadena. Div. of Geological and Planetary Sciences.
C. F. Raymond.
Journal of Glaciology, Vol 12, No 64, p 19-44, 1973. 12 fig, 1 tab, 33 ref.

Descriptors: *Glaciers, *Rheology, *Movement, *Flow, Stress, Strain, Plasticity, Viscosity, Creep, Temperature.

The distribution of stress and effective viscosity in a glacier may be calculated under the assumptions that the ice is quasi-viscous, the flow is time-independent, and acceleration forces are negligible. The differential equations of mechanical equilibrium, expressed in terms of viscosity, strain-rate components, mean stress, and their gradients, are solved for viscosity and mean stress subject to boundary conditions at the free upper surface. For some rectilinear flow patterns, unique distributions of stress and effective viscosity can always be derived. For more complicated flow this is not necessarily so. However, it is possible to choose the best values of rheological parameters, based on the requirement that the residuals of the equations of equilibrium be minimized. The techniques were applied to measurements of internal deformation made in nine boreholes on the Athabasca Glacier. At the centerline the magnitude of the surface-parallel shear stress increases with depth more slowly than would be expected from a standard shape factor correction or the theoretical distribution of Nye. The lateral distribution of lateral shear stress shows the opposite relationships. In the lower one- to two-thirds of the depth, corresponding to a range in effective stress from about 0.5 to 1.2 bars, the gross rheology of the ice is not distinguishably different from the experimentally determined flow law of Glen as generalized by Nye. The upper one- to two-thirds of the glacier constitutes an anomalous zone in which there is either a strong effect from a complex distribution of stress arising from longitudinal stress gradients or more complicated rheology than in a homogeneous power-law material. (Knapp-USGS)
W73-09087

THE CREEP OF ICE SHELVES: THEORY,
Scott Polar Research Inst., Cambridge, (England); and British Antarctic Survey, London (England).
R. H. Thomas.
Journal of Glaciology, Vol 12, No 64, p 45-53, 1973. 2 fig, 12 ref.

Descriptors: *Glaciers, *Rheology, *Movement, *Flow, Stress, Strain, Plasticity, Viscosity, *Creep, Temperature.
Identifiers: *Ice shelves.

A general expression is derived for creep in an ice shelf where the sole restriction is that of zero shear stresses in vertical planes. This is applied to the two special cases: movement of an ice shelf restricted in at least one direction by sea-water pressure only; and movement of an ice shelf flowing between roughly parallel sides. (See also W73-09089) (Knapp-USGS)
W73-09088

THE CREEP OF ICE SHELVES: INTERPRETATION OF OBSERVED BEHAVIOUR,
Scott Polar Research Inst., Cambridge (England); and British Antarctic Survey, London (England).
R. H. Thomas.
Journal of Glaciology, Vol 12, No 64, p 55-70, 1973. 10 fig, 2 tab, 19 ref.

Descriptors: *Glaciers, *Rheology, *Movement, *Flow, Stress, Strain, Plasticity, Viscosity, Creep, Temperature.
Identifiers: *Ice shelves.

A general expression is derived for creep in an ice shelf where the sole restriction is that of zero shear stresses in vertical planes. This is applied to the two special cases: movement of an ice shelf restricted in at least one direction by sea-water pressure only; and movement of an ice shelf flowing between roughly parallel sides. Available measurements of creep rates and dimensions of ice shelves were used to evaluate the flow law parameters at low stresses. The results show good agreement with laboratory work at higher stresses. Adoption of these values can be used to calculate the restraining effects on an ice shelf of obstructions such as areas of grounding. (See also W73-09088) (Knapp-USGS)
W73-09089

A FLOW LAW FOR TEMPERATE GLACIER ICE,
Washington Univ., Seattle. Geophysics Program.
S. C. Colbeck, and R. J. Evans.
Journal of Glaciology, Vol 12, No 64, p 71-86, 1973. 11 fig, 20 ref, append. NSF Grants GA1547 and GA1516 ONR Contract N00014-67-A-0103-0007.

Descriptors: *Glaciers, *Rheology, *Movement, *Flow, Stress, Strain, Plasticity, Viscosity, Creep, Temperature.
Identifiers: *Temperate glaciers.

Uniaxial compressive creep tests were performed on polycrystalline samples of glacier ice at stresses ranging from 0.06 bar to 1.0 bar under conditions similar to those actually occurring in a temperate glacier. Tests were conducted in an ice tunnel on the Blue Glacier, Mt Olympus, Washington, U.S.A., where the temperature remained at the pressure melting point. The flow law proposed as a one-dimensional flow law for temperate glacier ice is a polynomial expression containing linear, cubic and fifth-order terms. This law provides a good fit to the data and is also consistent with the quasi-viscous creep data of Glen. (Knapp-USGS)
W73-09090

RADIO ECHO SOUNDING ON A VALLEY GLACIER IN EAST GREENLAND,
Scott Polar Research Inst., Cambridge (England).
J. L. Davis, J. S. Halliday, and K. J. Miller.
Journal of Glaciology, Vol 12, No 64, p 87-91, 1973. 4 fig, 6 ref.

Descriptors: *Sounding, *Glaciers, *Radar, *Instrumentation, On-site collections, Ice, Radio waves, Depth, Surveys.
Identifiers: *Greenland.

Although radio echo sounding equipment has been used with success for measuring the thickness of ice sheets in the Arctic and Antarctic, a valley glacier poses the additional problems of echoes from the valley walls, which may obscure the bottom echoes, and a high attenuation of radio waves in the ice. During July and August 1970, a study was carried out on Roslin Gletscher in Stauning Alper, East Greenland, to investigate the problems of radio echo sounding on a valley glacier. Reflections from the valley walls may be minimized by using sufficiently directional antennae, but attenuation of the signal in the ice is higher than that in polar ice at the same temperature. Water in and on the ice probably accounts for much of the attenuation, and the use of a lower frequency or measurements before the melt commences should give improved performance. (Knapp-USGS)
W73-09091

ICE VOLCANOES OF THE LAKE ERIE SHORE NEAR DUNKIRK, NEW YORK, U.S.A.,
State Univ. Coll., Fredonia, N.Y. Dept. of Geology.
R. K. Fahnestock, D. J. Crowley, M. Wilson, and H. Schneider.
Journal of Glaciology, Vol 12, No 64, p 93-99, 1973. 7 fig.

Descriptors: *Lake Erie, *Ice, *Lake ice, Beaches, Iced lakes, Great Lakes, Freezing, Ice jams, *New York.
Identifiers: *Ice volcanoes, *Beach ice.

Conical mounds of ice form in a few hours during violent winter storms along the edge of shore-fast ice near Dunkirk, New York. They occur in lines which parallel depth contours, and are evenly spaced in the manner of beach cusps. The height and spacing of mounds and number of rows vary from year to year depending on such factors as storm duration and intensity and the position of the edge of the shore-fast ice at the beginning of the storm. The evenly sloping conical mounds have central channels which increase in width lakeward. The ice between the channels forms headlands above the lake surface. Sprayed-formed levees develop along the headlands and slope gently away from the lake margin. Lake marginal walls of ice are usually vertical. Spray, slush and ice blocks are ejected over the cone as each successive wave is focused by the converging channel walls. Ice blocks, interlayered with frozen slush and dirt, form bedding paralleling the sloping surface of cones, headlands and levees. These features are termed 'ice volcanoes' because their origin is in so many ways analogous to that of true volcanoes. (Knapp-USGS)
W73-09092

SEISMIC REFRACTION AND REFLECTION MEASUREMENTS AT 'BYRD' STATION, ANTARTICA,
Wisconsin Univ., Middleton. Geophysical and Polar Research Center.
H. Kohnen, and C. R. Bentley.

Journal of Glaciology, Vol 12, No 64, p 101-111, 1973. 9 fig, 2 tab, 14 ref. NSF Grants GV-27044 and GAn1706.

Descriptors: *Ice, *Glaciers, *Sea ice, *Antarctic, *Seismic studies, *Sounding, Depth, Surveys, Velocity, Geophysics, Explosives, Travel time.

Seismic refraction and reflection shooting along three profiles about 10 km long, angled 60 deg to one another, near Byrd station, Antarctica, during the 1970-71 field season showed no dependence of velocity upon azimuth, but velocities at 200 or 300 m depth were slightly greater than at a site 30 km away where measurements were made in 1958. The difference can probably be attributed to different ice fabrics arising from a 50% difference in snow accumulation rates at the two sites. The velocity-depth and density-velocity functions at the two sites are also significantly different, but close agreement was found at each site between the depths to significant changes in the velocity gradient and the depths of fundamental change in the densification process. Such agreement may permit density-depth curves, and consequently accumulation rates, to be measured by seismic refraction shooting alone. The reflection shooting on a common reflection-point profile led to a good determination of mean velocity through the ice as a function of angle of incidence. The results agree closely with similar measurements at the 1958 site, and with an anisotropic model based on glaciological and sonic logging observations in the deep drill hole. The mean vertical velocity of 3.90-3.93 km/s through the solid ice is about 2% higher than has commonly been used for determinations of ice thickness from seismic reflection shooting. (Knapp-USGS)
W73-09093

A PHOTOGRAMMETRIC SURVEY OF HOSEASON GLACIER, KEMP COAST, ANTARCTICA,
Ohio State Univ., Columbus. Dept. of Geodetic Science; and Ohio State Univ. Research Foundation, Columbus. Inst. of Polar Studies.
P. J. Morgan.
Journal of Glaciology, Vol 12, No 64, p 113-120, 1973. 4 fig, 1 tab, 9 ref.

Descriptors: *Photogrammetry, *Glaciers, *Antarctic, *Aerial photography, *Movement, Regimen, Surveys, Mapping, Glaciology.
Identifiers: *Hoseason Glacier (Antarctica).

A study of Hoseason Glacier, Antarctica, was made to test whether photogrammetry could yield meaningful glaciological information from repeated series of air photographs without ground control. Large time differences, different camera systems, and the use of sea ice as a level datum do not present insurmountable difficulties in photogrammetric reduction. Surface horizontal movement was determined and level profiles were compiled. Hoseason Glacier is probably in equilibrium. (Knapp-USGS)
W73-09094

MASS TRANSFER ALONG AN ICE SURFACE OBSERVED BY A GROOVE RELAXATION TECHNIQUE,
Cold Regions Research and Engineering Lab., Hanover, N.H.
K. Itagaki, and T. M. Tobin.
Journal of Glaciology, Vol 12, No 64, p 121-127, 1973. 3 fig, 1 tab, 19 ref.

Descriptors: *Mass transfer, *Ice, *Cryology, *Flow, *Evaporation, Freezing, Crystallography, Diffusion.
Identifiers: *Ice structure.

The mass transfer on an ice surface was measured using a groove decay technique at -10 deg C. The evaporation, condensation, and viscous flow terms in Mullins' theory were deduced from the change of decay constant as a function of groove wavelength between 16 and 80 microns. Viscous flow contributes the most to groove decay while evaporation and condensation contribute up to 31.5% of the mass transfer for the shortest wavelength measured. Large discrepancies between the decay constants obtained from the measurements and constants calculated from theory indicate that other mechanisms not considered in Mullins' theory may be responsible for the groove decay. (Knapp-USGS)
W73-09095

GLACIER BORE-HOLE PHOTOGRAPHY,
California Inst. of Tech., Pasadena. Div. of Geological and Planetary Sciences.
W. D. Harrison, and B. Kamb.
Journal of Glaciology, Vol 12, No 64, p 129-137, 1973. 11 fig, 2 ref.

Descriptors: *Photography, *Ice, *Glaciers, *Borehole cameras, Glaciology, Instrumentation, Movement.

A 51 mm diameter bore-hole camera allows observation of subglacial conditions, measurement of basal sliding rates, and study of internal structure and debris in ice at depth. The camera is simple in construction, field operation and maintenance. Water turbidity is a significant problem but it can be overcome by pumping. (Knapp-USGS)
W73-09096

RADIO ECHO SOUNDING: BRINE PERCOLATION LAYER,
Wisconsin Univ., Middleton. Geophysical and Polar Research Center.
J. W. Clough.
Journal of Glaciology, Vol 12, No 64, p 141-143, 1973. 2 fig, 3 ref.

Descriptors: *Sounding, *Radar, *Brines, *Ice, *Antarctic, Percolation, Radio waves, Depth, Surveys.
Identifiers: *Ice shelves.

An abrupt change in radio echo sounding traveltime was observed on the ice shelf near McMurdo station, Antarctica, and was mapped by a zig-zag traverse. This boundary corresponds to the horizontal extent of brine penetration into the edge of the ice shelf. (Knapp-USGS)
W73-09097

ACOUSTIC EMISSION IN SNOW AT CONSTANT RATES OF DEFORMATION,
Montana State Univ., Bozeman. Dept. of Earth Sciences.
W. F. St Lawrence, T. E. Lang, R. L. Brown, and C. C. Bradley.
Journal of Glaciology, Vol 12, No 64, p 144-146, 1973. 1 fig, 3 ref.

Descriptors: *Deformation, *Fractures (Geologic), *Snow, *Compaction, *Sound waves, Strain, Acoustics, Failure (Mechanics), Mechanical properties, Cryology.

Acoustic emissions in the audio spectrum were found in laboratory experiments conducted on snow samples in uniaxial compression. A number of tests show the pattern of acoustic emissions to be a function of the rate of deformation. Over the frequency range 20 to 7,000 Hz acoustic emissions are associated with rates of deformation corresponding to brittle fracture of the snow sample. No acoustic emissions were detected from samples deforming plastically. (Knapp-USGS)
W73-09098

2D. Evaporation and Transpiration

AN APPRAISAL OF POTENTIAL WATER SALVAGE IN THE LAKE MCMILLAN DELTA AREA, EDDY COUNTY, NEW MEXICO,
Geological Survey, Albuquerque, N. Mex.
For primary bibliographic entry see Field 03B.
W73-08493

HIGH YIELD FROM THE BULL RUN WATERSHED,
British Columbia Dept. of Municipal Affairs, Victoria. Environmental Planning and Management Div.
For primary bibliographic entry see Field 02A.
W73-08667

A MODEL FOR SIMULATING TRANSPIRATION OF LEAVES WITH SPECIAL ATTENTION TO STOMATAL FUNCTIONING,
Agricultural Univ., Wageningen (Netherlands). Dept. of Theoretical Production Ecology.
F. W. T. Penning De Vries.
J Appl Ecol. Vol 9, No 1, p 57-77, 1972. Illus.
Identifiers: Carbon, Cells, *Computer models, Diffusion, Leaves, Light, Oxide, Photosynthesis, Simulation, *Stomata, *Transpiration (leaves).

A dynamic model of a water-containing and water-conducting system is described, representing a non-growing, transpiring leaf with an attached root in a nutrient solution. The simulated transpiration rate is determined by environmental conditions and leaf conductivity, the latter being mainly under stomatal control. A hypothesis of stomatal functioning based upon the interaction between guard cells and subsidiary cells is presented. The control mechanism of the guard cells is supposed to be affected both by present and past plant water status, light intensity and CO2 concentration in the leaf, which depends on photosynthesis and diffusion rates. The function of subsidiary cells is taken to be affected only by present and past plant water status. Experiments are simulated to evaluate the model. The model is written in the computer simulation language CSMP (Continuous System Modeling Program).--Copyright 1972, Biological Abstracts, Inc.
W73-09039

2E. Streamflow and Runoff

FLOOD-PRONE AREAS, HARTFORD NORTH QUADRANGLE, CONNECTICUT,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W73-08472

1972 AIDJEX INTERIOR FLOW FIELD STUDY, PRELIMINARY REPORT AND COMPARISON WITH PREVIOUS RESULTS,
Washington Univ., Seattle. Dept. of Oceanography.
For primary bibliographic entry see Field 02C.
W73-08475

RUNOFF MAP OF SWEDEN: AVERAGE ANNUAL RUNOFF FOR THE PERIOD 1931-60,
Sveriges Meteorologiska och Hydrologiska Institut, Stockholm.
For primary bibliographic entry see Field 07C.
W73-08492

SOME OBSERVATIONS OF TURBULENT FLOW IN A TIDAL ESTUARY,
Naval Research Lab., Washington, D.C. Ocean Sciences Div.
For primary bibliographic entry see Field 02L.

W73-08494

DYNAMICS OF RIP CURRENTS,
Florida State Univ., Tallahassee. Dept. of Mathematics; and Florida State Univ., Tallahassee. Geophysical Fluid Dynamics Inst.
C. K. W. Tam.
Journal of Geophysical Research, Vol 78, No 12, p 1937-1943, April 20, 1973. 7 fig, 16 ref. NSF GP-30136, NOAA NG-3-72.

Descriptors: *Mathematical models, *Rip currents, Surf, Littoral drift, Waves (Water), Equations, Viscosity, Turbulence.

Rip currents were studied using a set of shallow water equations with a horizontal eddy viscosity term. A boundary layer analysis is based on the observed fact that rip currents are rather narrow. Similarity solutions of the model equations give reasonable representations of the velocity profile and other characteristics of rip currents. The mechanisms that are believed to be responsible for the formation of rip heads and turning of rip currents by the longshore momentum carried by the entrained fluid were analyzed. (Knapp-USGS)
W73-08495

A COMPARISON BETWEEN WIND AND CURRENT OBSERVATIONS OVER THE CONTINENTAL SHELF OFF OREGON, SUMMER 1969,
Oregon State Univ., Corvallis. Dept. of Oceanography.
A. Huyer, and J. G. Pattullo.
Journal of Geophysical Research, Vol 77, No 18, p 3215-3220, June 20, 1972. 7 fig, 9 ref. NR 083-102. NSF GA 1435, ONR N00014-67-A-0369-0007.

Descriptors: *Winds, *Currents (Water), *Continental shelf, *Oregon, Waves (Water), Current meters.

Wind and current observations made over the continental shelf off Oregon in the summer of 1969 are compared. The wind and current are related at periods longer than two days. The wind and current data were both filtered to suppress variations of diurnal and higher frequencies. The current behaves similarly to the wind when the wind varies slowly. The amplitude of the current fluctuations depends on the stratification of the water. The current is roughly parallel to the local bottom contours. (Knapp-USGS)
W73-08497

FIELD OBSERVATION OF NEARSHORE CIRCULATION AND MEANDERING CURRENTS,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
C. J. Sonu.
Journal of Geophysical Research, Vol 77, No 18, p 3232-3247, June 20, 1972. 13 fig, 30 ref. NR 388 002. ONR N00014-69-A-0211-0003.

Descriptors: *Currents (Water), *Littoral drift, *Rip currents, Surf, Beaches, Meanders, Sand waves, Waves (Water), Topography.

Wave-induced nearshore circulations and meandering longshore currents occur on an undulatory surf-zone bed, under the action of uniform incident waves. Circulations were associated with normal-wave incidence; meandering currents were associated with oblique-wave incidence. Spilling breakers over a shoal underwent greater energy dissipation than plunging breakers in the rip current. Observed streamlines were narrow in the outflow and broad in the inflow, a characteristic that was probably associated with a nonlinear mechanism arising from a steep depression in the rip channel. For a given surf-zone undulation, breaking over the inner bar was essential to the formation of a circulation, and the intensity of breaking, controlled by tide, corresponded with a proportionally stronger circulation. Thus, circulations were generally stronger during low tide than during high tide. Low rip-current velocities at high tide fluctuated with incoming swells, whereas high velocities at low tide tended to fluctuate at surf-beat frequencies. In proportion to increasing rep velocities, the rip pulsation tended toward lower intervals. Mean surface slopes caused by wave setup and setdown agreed with trajectories of neutral-density balls released in the circulation. Meandering currents associated with oblique-wave incidence could be explained as a combined effect of circulation cells and parallel longshore flows. (Knapp-USGS)
W73-08498

ENTRAINMENT OF SHELF WATER BY THE GULF STREAM NORTHEAST OF CAPE HATTERAS,
Naval Oceanographic Office, Washington, D.C. Ocean Science Dept.
A. Fisher, Jr.
Journal of Geophysical Research, Vol 77, No 18, p3248-3255, June 20, 1972. 9 fig, 16 ref.

Descriptors: *Mixing, *Ocean currents, *Remote sensing, Water temperature, Ocean circulation, Salinity, Sea water, Atlantic Ocean.
Identifiers: *Gulf stream, Cape Hatteras.

Entrainment of relatively cold low-salinity water by the Gulf Stream and subsequent formation of a cold filament adjacent to the northern edge of the Gulf Stream were frequently observed during a series of combined ship and aircraft surveys conducted northeastward of Cape Hatteras between October 1968, and May, 1969. Particularly well-defined entrainment was observed during mid-May, 1969, when a band of surface water 10 to 15 km wide and 40 meters thick was observed to reach from the continental shelf to the northern edge of the Gulf Stream. Transport seaward from the outer shelf is of the magnitude 10,000 cu m/sec. Failure to observe entrainment during some of the flights shows the discontinuous nature of the cold filament adjacent to the northern edge. (Knapp-USGS)
W73-08499

TEMPERATURE FLUCTUATIONS AT AN AIR--WATER INTERFACE CAUSED BY SURFACE WAVES,
Argonne National Lab., Ill.
J. Witting.
Journal of Geophysical Research, Vol 77, No 18, p 3265-3269, June 20, 1972. 8 ref.

Descriptors: *Water temperature, *Waves (Water), *Thermal stratification, *Air-water interfaces, Boundary processes, Heat flow.

Surface temperature variation is induced by a plane progressive irrotational linear water wave when a thermal boundary layer exists. When the wave period is sufficiently small (3 sec), the amplitude of the wave-induced temperature fluctuation is proportional to the wave amplitude and to the square root of the wave period. This result is in agreement with experiments. Surface temperature maximums lead wave crests by one-eighth of a period when the average surface temperature is less than the bulk water temperature; surface temperature minimums lead wave crests by one-eighth of a period when the average surface temperature exceeds that of the water below. (Knapp-USGS)
W73-08500

SEA LEVEL VARIATIONS IN THE GULF OF BOTHNIA,
E. Lisitzin.
Nordic Hydrology, Vol 4, No 1, p 41-53, 1973. 5 tab, 6 ref.

Descriptors: *Water level fluctuations, *Sea level, Europe, Tides, Subsidence, Data collections.
Identifiers: *Gulf of Bothnia.

Sea level variations were studied in the Gulf of Bothnia, which is isolated by islands and thresholds from the Baltic Sea proper. Observations from tide gauges during the 30-year period 1931-1960 were used. The effect of land uplift was taken into consideration. The maximum annual deviation in water volume from the long-term mean corresponded to 20.74 cu km. (Knapp-USGS)
W73-08508

CREATION OF CONDITIONAL DEPENDENCY MATRICES BASED ON A STOCHASTIC STREAMFLOW SYNTHESIS TECHNIQUE,
Arizona Univ., Tucson. Dept. of Systems Engineering.
D. M. Clainos, T. G. Roefs, and L. Duckstein.
Water Resources Research, Vol 9, No 2, p. 481-485, April 1973. 2 tab, 16 ref. OWRR A-024-ARIZ (6). 14-31-0001-3503.

Descriptors: Markov processes, *Synthetic hydrology, Statistical methods, Streamflow forecasting.
Identifiers: *Stochastic streamflow synthesis, *Transition probability matrices, Transforms.

The construction of transition probability matrices by the streamflow synthesis technique developed by the Hydrologic Engineering Center of the U.S. Army Corps of Engineers was tried. In certain cases it was found to be necessary to use a transform different from the Wilson-Hilferty transform used in the stated routine in order to produce reasonable results. Other details of the numerical considerations necessary for the definition of discrete conditional probability matrices between monthly flow volumes are described.
W73-08608

RIVER ECOLOGY AND MAN.
For primary bibliographic entry see Field 06G.
W73-08664

STREAM GAUGING INFORMATION, AUSTRALIA, SUPPLEMENT 1970.
Australian Water Resources Council, Canberra.
For primary bibliographic entry see Field 07C.
W73-08738

SUMMARIES OF STREAMFLOW RECORDS IN NORTH CAROLINA,
Geological Survey, Raleigh, N.C.
For primary bibliographic entry see Field 07C.
W73-08747

MATHEMATICAL ANALYSIS: STILL-WATER GAGE,
Louisiana State Univ., Baton Rouge. Dept. of Chemical Engineering.
For primary bibliographic entry see Field 07B.
W73-08755

PHYSICAL ASPECTS OF THE COLUMBIA RIVER AND ITS ESTUARY,
Oregon State Univ., Corvallis. Dept. of Oceanography.
For primary bibliographic entry see Field 02L.
W73-08818

RIVER-OCEAN NUTRIENT RELATIONS IN SUMMER,
Geological Survey, Menlo Park, Calif. Water Resources Div.
For primary bibliographic entry see Field 02L.
W73-08823

EFFECTS OF COLUMBIA RIVER DISCHARGE ON CHLOROPHYLL A AND LIGHT ATTENUATION IN THE SEA,
Oregon State Univ., Corvallis. Dept. of Oceanography.
For primary bibliographic entry see Field 02L.
W73-08825

COLLAPSIBLE LOESS IN IOWA,
Iowa State Univ., Ames.
For primary bibliographic entry see Field 02G.
W73-08876

STREAMFLOW FORMATION AND COMPUTATIONS (FORMIROVANIYE I RASCHETY RECHNOGO STOKA).
Ukrainskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Kiev (USSR).

Ukrainskiy Nauchno-Issledovatel'skiy Gidrometeorologicheskiy Institut Trudy, No 116, Moscow, K. A. Lysenko, editor, 1972. 160 p.

Descriptors: *Streamflow, *Runoff, *Discharge measurement, *Discharge (Water), Floods, Hydrographs, Water levels, Low flow, Rivers, Tributaries, Interfluves, Ponds, Reservoirs, Reservoir silting, Hydroelectric plants, Ice jams, Avalanches, Meteorology, Geophysics, Variability.
Identifiers: *USSR, *Ukraine, Carpathian Mountains.

Various aspects of river discharge measurement in different parts of the Ukraine were investigated in this collection of 13 papers prepared by scientific workers at the Ukrainian Scientific Research Hydrometeorological Institute in Kiev. The titles of the papers are: (1) effects of human activity on changes in surface runoff in the Western Bug River basin; (2) calculation of silt accumulation in small reservoirs; (3) manifestations of solar activity and other space and geophysical factors in the variations of discharge of the Dnieper River; (4) observations and calculations of the propagation of release waves in the tailwater channel of the Kiev Hydroelectric Plant; (5) flood hydrographs of rare frequency on rivers in the Azov Sea region; (6) formation of storm floods on small watercourses in the steppe zone of European Russia; (7) on-site investigations of outstanding floods in the Carpathians and measurement of their maximum discharges; (8) formation of low flows in rivers of the Western Bug, Pripyat', and Dniester interfluve; (9) formation and measurement of minimum flows in tributaries of the Araks River; (10) formation of ice jams in lower reaches of the Danube River; (11) avalanches in the Teresva River basin and methods of their prevention and control; (12) effects of ponds and reservoirs on runoff of left-bank tributaries of the Dniester River; and (13) problems in the measurement of river lengths. (Josefson-USGS)
W73-08880

EFFECTS OF FLOODS ON TROUT IN SAGEHEN CREEK, CALIFORNIA,
Forest Service (USDA), Upper Darby, Pa. Northeastern Forest Experiment Station.
D. W. Seegrist.
Trans Am Fish Soc. Vol 101, No 3, p 478-482. 1972. Illus.
Identifiers: *California, *Floods, Sagehen Creek (Calif), Salmo-Gairdneri, Salvelinus-Fontinalis, *Trout.

Effects of winter and spring floods on rainbow (Salmo gairdneri) and brook (Salvelinus fontinalis) trout were evaluated over a 10-yr period in Sagehen Creek, California. Winter floods decimated developing eggs of fall-spawning brook trout. Because of reduced competition by young brook trout, survival of spring-spawned rainbow fry increased in years following winter floods. Conversely, spring floods destroyed rainbow eggs, thereby enhancing survival of young brook trout. Floods changed the species composition markedly and these changes endured for several years. Adult trout were adversely affected by the worst flood studied, but were unaffected by other floods of lesser magnitude. Effects of floods were not nearly as pronounced or predictable on adult trout as they were on young trout. --Copyright 1973, Biological Abstracts, Inc.
W73-08907

STREAMFLOW DATA USAGE IN WYOMING,
Wyoming Univ., Laramie. Water Resources Research Inst.
For primary bibliographic entry see Field 07C.
W73-09004

FISHES OF THE NORTHEASTERN WOOD BUFFALO NATIONAL PARK REGION, ALBERTA AND NORTHWEST TERRITORIES,
Alberta Univ., Edmonton. Dept. of Zoology.
J. S. Nelson, and M. J. Paetz.
Can Field Nat. Vol 86, No 2, p 133-144. 1972.
Identifiers: Alberta, Canada, *Dace, *Darter, Distribution, Fishes, Habitat, *Minnow (Fathead), National parks, Northwest-Territories, Park, *Stickleback.

Five species of small fishes (northern red-belly dace, fathead minnow, pearl dace, brook stickleback, and Iowa darter) have their known northern distributional limits in landlocked lakes and small creeks in the northern Wood Buffalo National Park region. They are surprisingly abundant along their northern fringe but are poorly known to the immediate south. The majority of individuals of 2 spp. of sickleback (brook and ninespine sticklebacks± fail to develop the pelvic skeleton in several localities. Habitats within the region are unusual, consisting of karst topography (with sinkhole lakes and the possibiltiy of underground drainage connections) and streams of relatively high salinity.--Copyright 1973, Biological Abstracts, Inc.
W73-09008

USE OF DISPOSABLE BEVERAGE CANS BY FISH IN THE SAN JOAQUIN VALLEY,
Fresno State Coll., Calif. Dept. of Biology.
G. M. Kottcamp, and P. B. Moyle.
Trans Am Fish Soc. Vol 101, No 3, p 566. 1972.
Identifiers: Breeding, *California, *Cans (Disposable), *Fish, San-Joaquin Valley.

A surprisingly heavy use of disposable beverage cans, for shelter and breeding, by 6 spp. of fish in streams of the San Joaquin Valley, California, including juveniles of 3 spp. of game fish, is reported.--Copyright 1973, Biological Abstracts, Inc.
W73-09060

FLOODS IN THE IOWA RIVER BASIN UPSTREAM FROM CORALVILLE LAKE, IOWA,
Geological Survey, Iowa City, Iowa.
For primary bibliographic entry see Field 07C.
W73-09084

STABILITY OF ROTATIONAL COUETTE FLOW OF POLYMER SOLUTIONS,
Delaware Univ., Newark. Dept. of Chemical Engineering.
For primary bibliographic entry see Field 08B.
W73-09100

2F. Groundwater

INVESTIGATION OF FACTORS RELATIVE TO GROUNDWATER RECHARGE IN IDAHO,
Idaho Univ., Moscow. Dept. of Hydrology.
For primary bibliographic entry see Field 05D.
W73-08456

MAP SHOWING GENERAL AVAILABILITY OF GROUND WATER IN THE SALINA QUADRANGLE, UTAH,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W73-08473

MAJOR AQUIFERS AND SAND GRAVEL RESOURCES IN BROWN COUNTY, SOUTH DAKOTA,
Geological Survey, Washington, D.C.
N. C. Koch, W. Bradford, and D. I. Leap.
South Dakota Geological Survey Information Pamphlet No 4, 1973. 9 p, 4 fig, 1 tab.

Descriptors: *Aquifers, *South Dakota, *Glacial drift, Water yield, Groundwater resources, Hydrogeology, Hydrologic data, Sands, Gravels.
Identifiers: *Brown County (S.D.).

The general distribution, quality, and physical characteristics of the major aquifers and the general distribution of sand and gravel resources in Brown County, S. D., are described. Three major glacial aquifers--the Deep James, Middle James, and Elm--are present in the county. The Deep James aquifer underlies an area of about 250 sq mi in Brown County. The aquifer consists of an interconnected system of channels extending from southwestern Brown County in a north and northeast direction across the county. The channels are filled with clay, silt, sand, and gravel, with sand and gravel thickness ranging from 1 to 160 ft. The Deep James aquifer may yield as much as 1,000 gpm to properly constructed wells at depths ranging from 150 to 380 ft. The major bedrock aquifers in Brown County are the Dakota Sandstone and the Fall River and Sundance Formations. (Knapp-USGS)
W73-08477

GROUNDWATER DEVELOPMENT AND ITS INFLUENCE ON THE WATER BALANCE,
Technical Univ., of Denmark, Copenhagen.
E. Hansen, and S. A. Andersson.
Nordic Hydrology, Vol 4, No 1, p 28-40, 1973. 9 fig, 1 tab, 5 ref.

Descriptors: *Surface-groundwater relationships, *Induced infiltration, *Water yield, *Transmissivity, Withdrawal, Recharge, Artesian aquifers, Hydrogeology, Aquifer testing.
Identifiers: *Denmark.

Lowering the head of an artesian aquifer in Zealand, Denmark, by pumping of groundwater affects the regional water balance. Based on known amounts of groundwater being developed, the coefficient of transmissivity was determined and in combination with piezometric maps the net outflow of groundwater was computed for the prepumping period as well as for the pumping period. By lowering the head in the artesian aquifer, groundwater development influences the water balance, especially by causing a decrease in the streamflow as a consequence of an increased infiltration. The decrease in streamflow causes a decrease in the yearly minimum runoff as well as a marked increase in the length of the periods of low flows. The evapotranspiration is approximately 370 mm/per year, uninfluenced by the groundwater development. (Knapp-USGS)
W73-08507

HYDROLOGY OF THE UPPERMOST CRETACEOUS AND THE LOWERMOST PALEOCENE ROCKS IN THE HILIGHT OIL FIELD, CAMPBELL COUNTY, WYOMING,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 04B.
W73-08725

GROUNDWATER RESOURCES OF WASHINGTON COUNTY, TEXAS,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 04B.
W73-08739

GROUNDWATER RESOURCES OF NAVARRO COUNTY, TEXAS,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 04B.
W73-08740

GROUND-WATER RESOURCES OF HARDEMAN COUNTY, TEXAS,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 04B.
W73-08741

WATER-LEVEL RECORDS, 1969-73, AND HYDROGEOLOGIC DATA FOR THE NORTHERN HIGH PLAINS OF COLORADO,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W73-08745

SALINE GROUNDWATER RESOURCES OF MISSISSIPPI,
Geological Survey, Jackson, Miss.
For primary bibliographic entry see Field 07C.
W73-08750

LIMITATIONS OF DARCY'S LAW IN GLASS BEAD POROUS MEDIA,
Oregon State Univ., Corvallis. Dept of Soil Science.
For primary bibliographic entry see Field 02G.
W73-08870

HYDROGEOLOGY AND KARST STUDIES (GIDROGEOLOGIYA I KARSTOVEDENIYE).
Perm State Univ. (USSR). Inst. of Karst Studies and Peleology.
For primary bibliographic entry see Field 02K.
W73-08998

THE PERMEABILITY OF A UNIFORMLY VUGGY POROUS MEDIUM,
Alberta Univ., Edmonton.
G. H. Neale, and W. K. Nader.
Society of Petroleum Engineers Journal, Vol 13, No 2, p 69-74, April 1973. 4 fig, 8 ref.

Descriptors: *Permeability, *Porous media, *Fracture permeability, Equations, Darcys law, Groundwater movement.
Identifiers: *Secondary permeability, *Vugs, *Brinkman equation.

The familiar Darcy equation is inadequate for studies involving liquid flow through porous media containing open spaces. The Brinkman equation was applied to the problem of creeping liquid flow through an isotropic porous medium containing an isolated spherical cavity. An exact solution for the pressure distribution prevailing throughout this system was determined. (Knapp-USGS)
W73-09076

DATA REQUIREMENTS FOR MODELING A GROUND-WATER SYSTEM IN AN ARID REGION,
Geological Survey, Menlo Park, Calif.
F. Kunkel.
Available from NTIS, Springfield, Va. 22151 PB-219 588 Price $3.00 printed copy; $1.45 microfiche.
Geological Survey Water-Resources Investigation 4-73, March 1973. 21 p, 12 fig, 11 ref.

Descriptors: *Groundwater resources, *Arid lands, *Hydrology, *Groundwater movement, *Hydrogeology, Model studies, Systems analysis, Input-output analysis, Computer programs, Hydrologic data, Data processing, Water levels, Geology, Transmissivity, Storage coefficient, Groundwater recharge.
Identifiers: Hydrologic models.

The Geological Survey has successfully modeled many groundwater basins in arid regions. In considering the problems of modeling, this paper presents an overaimplified summary. The mathematical formulas are known and the computer capability exists that permits accurate modeling of interrelated surface water and groundwater systems in arid regions if the required data can be assembled. Existing data are often insufficient to provide the needed inputs to construct and verify a model that will be adequate for predicting future water levels. However, even unverified models may be of considerable value in providing the basis for determining the direction and scope of future data-collection programs to insure maximum return. Reports on models for areas in California and for selected areas in Utah and Arizona are given in the list of references. (Woodard-USGS)
W73-09078

2G. Water in Soils

CHARACTERIZATION OF WATER MOVEMENT INTO AND THROUGH SOILS DURING AND IMMEDIATELY AFTER RAINSTORMS,
Kentucky Water Resources Inst., Lexington.
C. T. Haan.
Available from the National Technical Information Service as PB-220 014, $3.00 in paper copy, $1.45 in microfiche. Research Report No 56, December 1972. 34 p, 8 fig, 1 tab, 25 ref. OWRR A-025-KY (3), 14-31-0001- (3217-3517).

Descriptors: *Infiltration, *Mathematical models, *Darcys law, *Rainfall-runoff relationships, Mathematical studies, Diffusivity, Soil water movement, Groundwater movement, Water yield.

Darcy's Law and the continuity equation were studied to find if they could be used to describe watershed infiltration and thus be incorporated into hydrologic models. Even on apparently uniform soils there is a great deal of variability in soil water properties. Handling this variability plus the difficulty of solving the flow equation led to the conclusion that a simpler approach to modelling watershed infiltration is needed. A simple empirical infiltration model was developed and included in a rainfall-runoff model. Tests with the model indicate that it produces satisfactory estimates of monthly runoff from small rural watersheds. (Knapp-USGS)
W73-08464

THE RELATION BETWEEN SOIL CHARACTERISTICS, WATER MOVEMENT AND NITRATE CONTAMINATION OF GROUNDWATER,
Kentucky Water Resources Inst., Lexington.
For primary bibliographic entry see Field 05B.
W73-08465

THE INFLUENCE OF IRON AND ALUMINUM HYDROXIDES ON THE SWELLING OF NA--MONTMORILLONITE AND THE PERMEABILITY OF A NA-SOIL,
Reading Univ. (England). Dept. of Soil Science.
H. M. E. El Rayah, and D. L. Rowell.
Journal of Soil Science, Vol 24, No 1, p 137-144, March 1973. 2 fig, 23 ref.

Descriptors: *Expansive soils, *Expansive clays, *Saline soils, *Montmorillonite, *Permeability, Soil water movement, Aluminum, Iron, Clay minerals, Mineralogy, Ion exchange.

Hydroxy Fe and Al interlayers reduce the swelling of Na-montmorillonite in NaCl solutions. A deposit of sesquioxide around an aggregate or orientated flake of clay restricts swelling until the sesquioxide coating is broken by the swelling pressure of the clay. Al is more effective than Fe. The effect of sesquioxides on the permeability to NaCl solutions of an alkali soil depends on the control of clay swelling in a manner expected from the above results. A sesquioxide coating around a soil aggregate stabilizes the structure until the coating is broken by the swelling pressure of the clay in the aggregate. (Knapp-USGS)
W73-08509

A METHOD FOR STUDYING SOIL-WATER PROPERTIES OF SOIL PROFILES,
Agricultural Research Council, Cambridge, (England). Unit of Soil Physics.
A. Poulovassilis.
Journal of Soil Science, Vol 24, No 1, p 117-124, March 1973. 5 fig, 8 ref.

Descriptors: *Infiltration, *Soil water movement, *Soil properties, *Percolation, *Soil moisture meters, Instrumentation, Hydraulic conductivity, Pore water, Unsaturated flow.

A method for studying the soil water properties of soil profiles consists of infiltrating water at a constant rate at the surface of the soil and determining the resulting steady-state suction and moisture profiles down the soil profile. It was applied for relating the pore-water suction and hydraulic conductivity to the pore-water content of a 2-m-long soil monolith. (Knapp-USGS)
W73-08510

PERSISTENCE AND REACTIONS OF C-1-4-CACODYLIC ACID IN SOILS,
Agricultural Research Service, Beltsville, Md. Agricultural Environmental Quality Inst.
For primary bibliographic entry see Field 05B.
W73-08542

GAS-LIQUID CHROMATOGRAPHIC DETERMINATION OF METHYL ISOTHIOCYANATE IN SOILS,
Ontario Dept. of Agriculture and Food, Guelph, Provincial Pesticide Residue Testing Lab.
For primary bibliographic entry see Field 05A.
W73-08573

SOME BEHAVIOR PATTERNS IN THE REDISTRIBUTION OF MOISTURE ON SLOPES,
Ye. N. Ramanova.
Available from NTIS, Springfield, Va 22151 as N-72 28355, Price $3.25 printed copy; $1.45 microfiche. National Aeronautics and Space Administration Technical Translation TT F-14,352, July 1972. 22 p, 1 fig, 11 tab, 10 ref. (Trans. of Trudy Glavnoy Geofizicheskoy Observatorii, No 147, Leningrad, 1963, p 66-82. NASA 2038-w.

Descriptors: *Soil water movement, *Slopes, *Drainage patterns (Geologic), *Hydrologic equation, Methodology, Data collections, Soil types, Topography, Precipitation (Atmospheric), Melt water, Snow cover, Rainfall, Physical properties.
Identifiers: *USSR.

A method for calculating the redistribution of water from summer rains over undulating relief is used to determine the amount of water entering the soil over different sections of slopes. The amount of water absorbed by soil on slopes, and along their bases, is calculated for several points by type of soil. Data show the influence exerted by type of soil. Sandy loam soils absorb much more water than do loamy soils, with the result that the moisture in different parts of sandy loam slopes is much more uniform than on loamy slopes, the upper parts of which are much drier than the plains. The feet of loamy slopes, on the other

hand, receive much more water than do the feet of the sandy loam slopes. Therefore, on the basis of consideration of the redistribution of precipitation along a slope, an expression was obtained to determine the quantity of water entering the soil on different parts of a slope, and at its foot. (Woodard-USGS)
W73-08729

THE INFLUENCE OF TEMPERATURE ON THE DIRECTION OF WATER MOVEMENT IN THE SOIL,
National School of Agriculture, Maison-Carree (Algeria).
H. Roseau.
Available from NTIS, Springfield, Va 22151 as N72-26305 Price $3.00 printed copy; $1.45 microfiche. Nat Aero and Space Admin Tech Trans Report NASA TT-F-14325, July 1972. 8 p, 2 fig. (Trans of 'Sens du mouvement de l'eau dans le sol sous l'influence de la temperature, 'Centre National de la Recherche Scientifique, France, Colloques Internationaux, No 35, p 347-352, 1953).

Descriptors: *Soil water movement, *Soil temperature, *Soil types, *Soil physics, Laboratory tests, Analytical techniques, Correlation analysis, Soil properties, Drainage, Lysimeters.

The results of observations are presented, utilizing lysimetric boxes set at the end of the flow, on the variations of drainage with temperature. Observing that the volume of runoff passing (per unit time) at the bottom of the box varies in the same way as the temperature of the surface soil layer, an explicative theory of this phenomenon is proposed. The early alluvials require less waterfall than the recent alluvials in order for drainage to occur in the winter. This phenomenon linking hourly flow to temperature presents two characteristics: (1) it is spontaneous--increased run-off, per unit time, immediately indicates an elevation of temperature; and (2) it is independent of the type of soil. In order for this phenonmenon to occur, drainage must be almost complete. (Woodard-USGS)
W73-08736

DURATION OF VIABILITY AND THE GROWTH AND EXPIRATION RATES OF GROUP E STREPTOCOCCI IN SOIL,
Missouri Univ. Columbia. School of Veterinary Medicine.
For primary bibliographic entry see Field 05B.
W73-08774

LIMITATIONS OF DARCY'S LAW IN GLASS BEAD POROUS MEDIA,
Oregon State Univ., Corvallis. Dept of Soil Science.
L. Boersma, F. T. Lindstrom, and S. K. Saxena.
Soil Science Society of America Proceedings, Vol 37, No 2, p 333-335, March-April, 1973. 2 fig, 2 tab.

Descriptors: *Porous media, *Saturated flow, *Darcys law, *Non-Newtonian flow, Viscosity, Rheology, Pores, Porosity, Soil water movement, Groundwater movement.

In dispersion experiments in porous systems made up of glass beads, flow rates are not proportional to the hydraulic gradient but are proportional to this gradient raised to the power 1/n where n>1. These results agree with literature reports which have indicated that for flow through small pores, the flow fields undergo a change from Newtonian to non-Newtonian behavior. In these experiments, the porous systems were made up of glass beads so that all effects attributed to clay-water interactions could be ruled out. (Knapp-USGS)
W73-08870

HORIZONTAL INFILTRATION OF WATER IN SOILS: A THEORETICAL INTERPRETATION OF RECENT EXPERIMENTS,
Yale Univ., New Haven, Conn. Dept. of Engineering and Applied Science.
J-Y. Parlange.
Soil Science Society of America Proceedings, Vol 37, No 2, p329-330, March-April 1973. 1 fig, 5 ref.

Descriptors: *Infiltration, *Diffusivity, *Diffusion, *Soil water movement, Soil moisture, Mathematical studies, Equations.
Identifiers: *Horizontal infiltration.

A general theory of water movement is used to describe the horizontal infiltration of water when the diffusivity increases exponentially with moisture content. The results can be expressed in simple analytical form and are in excellent agreement with experimental observations. The results confirm that the theory is accurate because water diffusivity varies with water content. (Knapp-USGS)
W73-08871

WATER MOVEMENT AND CALICHE FORMATION IN LAYERED ARID AND SEMIARID SOILS,
Nevada Univ., Reno.
D. M. Stuart, and R. M. Dixon.
Soil Science Society of America Proceedings, Vol 37, No 2, p 323-324, March-April 1973.

Descriptors: *Caliche, *Leaching, *Soil formation, Weathering, Calcareous soils, Calcium carbonate, Hardpan, Infiltration, Soil water movement.

In soils, downward water movement is restricted when fine-textured materials are underlain by sand or gravel layers. Water accumulates in arid and semiarid soils at the interface of the fine- and coarse-textured materials and may rarely enter the coarse-textured materials. Calcium carbonate, silica, and other salts are deposited at or near the top of the sand or gravel layers as water is removed by evapotranspiration. With time, silica, calcium carbonates, and other salts become cemented or indurated, forming calcareous crusts at these interfaces. The sands and gravels are not wet uniformly when water does enter, because it enters relatively small areas. Calcareous concentrations may form in these small, wetted areas and may be seen as calcareous cemented columns surrounded by non-calcareous sands or gravels. (Knapp-USGS)
W73-08872

ANALYSIS OF MULTIDIMENSIONAL LEACHING,
Commonwealth Scientific and Industrial Research Organization, Wembley (Australia). Div. of Soils.
A. J. Peck.
Soil Science Society of America Proceedings, Vol 37, No 2, p 320, March-April 1973. 4 ref.

Descriptors: *Leaching, *Infiltration, *Steady flow, Soil water movement, Drainage, Saline water, Equations, Saline soils.

A simplified analysis is given for leaching from the soil surface to tile drains while infiltration is steady and uniform. Leachate concentration is predicted to decay exponentially with characteristics determined by physical parameters of the system. Predicted decay characteristics are in good agreement with Mulqueen and Kirkham's experimental data. (Knapp-USGS)
W73-08873

A NOTE ON A THREE-PARAMETER SOIL-WATER DIFFUSIVITY FUNCTION-APPLICATION TO THE HORIZONTAL INFILTRATION OF WATER,
Yale Univ., New Haven, Conn. Dept. of Engineering and Applied Science.
J-Y. Parlange.
Soil Science Society of America Proceedings, Vol 37, No 2, p 318-319, March-April 1973. 2 tab, 5 ref.

Descriptors: *Infiltration, *Diffusivity, *Diffusion, *Soil water movement, Soil moisture, Mathematical studies, Equations.
Identifiers: *Horizontal infiltration.

A realistic water-diffusivity function depending on three parameters described recently by Ahuja and Swartzendruber is solved analitically for the horizontal infiltration of water. The result is expressed in terms of elementary functions and agrees very well with experimental observations. (Knapp-USGS)
W73-08874

THE RELATIONSHIP BETWEEN RAINFALL FREQUENCY AND AMOUNT TO THE FORMATION AND PROFILE DISTRIBUTION OF CLAY PARTICLES,
Illinois Univ., Urbana. Dept. of Agronomy.
T. M. Goddard, E. C. A. Runge, and B. W. Ray.
Soil Science Society of America Proceedings, Vol 37, No 2, p 299-304, March-April 1973. 3 fig, 3 tab, 8 ref.

Descriptors: *Loess, *Clay minerals, *Soil formation, *Soil water, Leaching, Clays, Illinois, Soil chemistry, Infiltration, Weathering.
Identifiers: *Pedogenic clays, *Rainfall frequency.

In Typic Argiudolls in Illinois the amount of pedogenic clay formed is controlled by rainfall frequency. The amount of leaching was not related to the amount of pedogenic clay. This finding may help explain why the clay minerals found in the argillic horizon of some soils are not in the clay mineral stability field predicted by dilute solution chemistry. The distribution of clay within the soil profile is related to the amount and distribution of rainfall (leachable water), depth of leaching, and natural drainage class. (Knapp-USGS)
W73-08875

COLLAPSIBLE LOESS IN IOWA,
Iowa State Univ., Ames.
R. L. Handy.
Soil Science Society of America Proceedings, Vol 37, No 2, p 281-284, March-April 1973. 4 fig, 1 tab, 20 ref.

Descriptors: *Loess, Collapse, *Subsidence, *Compaction, *Soil compaction, Consolidation, Clays, Clay minerals, Soil mechanics, Bulk density, *Iowa.
Identifiers: *Collapsible loess.

The collapsibility, or tendency towards rapid consolidation or settlement upon saturation by water, of many loess soils is pertinent to soil genesis, erosion, and engineering. The potential of a loess soil to collapse may be established from samples saturated while under load in a consolidation testing machine. Loess containing less than 20% 0.005 mm clay is very likely to be collapsible; with 30% clay there is a 50% probability of collapse, and with over 40% clay there is only a small likelihood of collapse. These percentages were compared to published clay content contours to estimate the areal extent of collapsible loess in Iowa. (Knapp-USGS)
W73-08876

EFFECT OF FLOODING ON THE EH, PH, AND CONCENTRATIONS OF FE AND MN IN SEVERAL MANITOBA SOILS,
Manitoba Univ., Winnipeg. Dept. of Soil Science.
M. O. Olomu, G. J. Racz, and C. M. Cho.
Soil Science Society of America Proceedings, Vol 37, No 2, p 220-224, March-April 1973. 9 tab, 19 ref.

Descriptors: *Iron, *Manganese, *Oxidation-reduction potential, *Hydrogen ion concentration, *Saturated soils, Floods, Flooding, Reduction (Chemical), Solubility, Mineralogy, Soil chemistry, Canada, Organic matter.
Identifiers: *Manitoba (Canada).

In flooded soils, the concentrations of Fe and Mn increased with chemical reduction; pH changes were relatively small. The measured concentrations of Fe in the soil solution were much greater than predicted by the observed Eh and pH values. Iron was complexed with organic matter; these complexes were negatively charged and relatively stable. Manganese in soil solution was partly complexed with organic matter in relatively unstable complexes. (Knapp-USGS)
W73-08877

DYNAMIC MEASUREMENT OF SOIL AND LEAF WATER POTENTIAL WITH A DOUBLE LOOP PELTIER TYPE THERMOCOUPLE PSYCHROMETER,
British Columbia Univ., Vancouver. Dept. of Soil Science.
T. L. Chow, and J. De Vries.
Soil Science Society of America Proceedings, Vol 37, No 2, p 181-188, March-April 1973. 11 fig, 14 ref. Canada National Research Council Grant A2556.

Descriptors: *Soil mosture meters, *Water temperature, *Thermometers, Soil temperature, Soil water movement, Calibrations, Temperature, Heat flow, Groundwater potential, Soil-water-plant relationships, Potential flow.
Identifiers: *Psychrometers, *Thermocouples.

Details on the construction, calibration, and performance of a three-terminal double loop thermocouple psychrometer are given. The thermal stability of this psychrometer is about 40 times better than that of the two-terminal psychrometer (Spanner type) for ambient temperature fluctuations with a time rate of change greater than 0.2C/min. The response behaviors of a fritted glass bulb and a ceramic bulb psychrometer were tested for vapor and for liquid phase water movement. For vapor phase flow the fritted glass bulb exhibited a shorter response time then the ceramic bulb psychrometer, whereas the reverse was true when water movement was predominantly in the liquid phase. Water potential measurements carried out on silty clay and silt loam soil samples were within plus or minus 0.4 bar of those from the porous plate extractor. A system that facilitates automatic and continuous in situ measurement of soil water potential using the three-terminal psychrometer is described. (Knapp-USGS)
W73-08878

SOIL WATER FLOWMETERS WITH THERMOCOUPLE OUTPUTS,
Agricultural Research Service, Kimberly, Idaho. Snake River Conservation Research Center.
J. W. Cary.
Soil Science Society of America Proceedings, Vol 37, No 2, p 176-181, March-April 1973. 7 fig, 1 tab, 8 ref.

Descriptors: *Flowmeters, *Soil water movement, *Water temperature, *Instrumentation, Thermometers, Temperature, Soil temperature, Heat flow, Seepage.
Identifiers: *Thermocouples.

Two soil water flowmeters with thermocouple sensors are described. The meter with a sensitivity of 0.1 mm of waterflow per day is recommended for flux measurements in the surface meter of soil when the water matrix potential is greater than 0.8 bar. Calibration factors for three soils with different textures are presented as a family of curves. These curves may be interpolated for using the flowmeter in other soils, possibly without a loss of accuracy greater than the natural water flow variation from place to place in the field. The meter with a sensivity of about 0.5 mm per day will require some additional development and testing before it can be recommended for routine use. It does offer the possibility of making measurements at soil water matric potentials less than 1 bar and at relatively deep soil depths. The thermocouple flow transducer developed for the meters may be used to measure saturated soil waterflow or other liquid flows as small as 1 ml/day. (Knapp-USGS)
W73-08879

A. THE ROLE OF LICHENS IN ROCK WEATHERING AND SOIL FORMATION. B. MERCURY IN SEDIMENTS,
Wisconsin Univ., Madison.
For primary bibliographic entry see Field 05B.
W73-08930

SOIL PHYSICAL CONDITIONS AFFECTING SEEDLING ROOT GROWTH: I. MECHANICAL IMPEDANCE, AERATION AND MOISTURE AVAILABILITY AS INFLUENCED BY BULK DENSITY AND MOISTURE LEVELS IN A SANDY LOAM SOIL,
For primary bibliographic entry see Field 02I.
W73-09029

DIFFUSION COEFFICIENT OF I-IONS IN SATURATED CLAY SOIL,
A. Hamid.
Plant Soil. Vol 36 No 3, p709-711. 1972.
Identifiers: Adsorption, *Clays, Diffusion coefficient, *Iodine ions, Saturated Soils.

The diffusion of I-ions was measured in saturated clay soil using radioactive I131 and I-ions. The measured diffusion coefficient of I-ions was 1.96 x 10-7 cm2/sec in disturbed soil and 0.67 x 10-7 cm2/sec in undisturbed soil. The positive adsorption of I-ions resulted in lower diffusion coefficient of I-ions than that of C1-ions.--Copyright 1972, Biological Abstracts, Inc.
W73-09030

IRRIGATED AGRICULTURE AS A METHOD OF DESERT SOIL RECLAMATION (IN RUSSIAN),
M. D. Muratov.
Probl Osvoeniya Pustyn'. 1, p 10-15, 1972. English summary.
Identifiers: Agriculture, *Cotton-D, *Desert soils, Irrigation, *Soil reclamation.

Two-year experiments were conducted on desert sandy, grey-brown and takyr soils in the Karshinskaya steppe. In desert sandy soils early cotton germination and ripening was observed. The yield of raw-cotton was 18.5 centners/ha in desert sandy soils, approximately 15 in grey-brown and 34.9 in takyr soils. Desert sandy soils exceed the grey-brown ones in agricultural reclamation properties and productive capacity but, to some extent, are poorer than takyr soils.--Copyright 1972, Biological Abstracts, Inc.
W73-09031

BONDING OF WATER TO ALLOPHANE,
Department of Scientific and Industrial Research, Lower Hutt (New Zealand). Soil Bureau.
For primary bibliographic entry see Field 02K.
W73-09041

INTERLAYER HYDRATION AND THE BROADENING OF THE 10 A X-RAY PEAK IN ILLITE,
Battelle-Northwest, Richland, Wash.
R. C. Routson, J. A. Kittrick, and E. H. Hope.
Soil Sci. Vol 113, No 3, p 167-174, 1972.
Identifiers: Heat, *Hydration, *Illite, *X-ray, Temperature.

X-ray peak broadening was due in part to reversible interlayer hydration. During heating to 300C, 2 K-saturated (based) illites dehydrated gradually, whereas Cs-saturated illites contracted abruptly at lower temperatures. The water reversibly released from K-saturated illites at low temperatures is considered to be physically entrapped due to the closure of dehydrated edges. High temperature water in illites in excess of that predicted from the muscovite formula may also be physically entrapped.--Copyright 1972, Biological Abstracts, Inc.
W73-09042

THE ECOLOGY OF MORECAMBE BAY: VI. SOILS AND VEGETATION OF THE SALT MARSHES: A MULTIVARIATE APPROACH,
Nature Conservancy, Norwich (England). Coastal Ecology Research Station.
For primary bibliographic entry see Field 02L.
W73-09067

CAUSES OF INFILTRATION INTO YELLOW-BROWN PUMICE SOILS,
Waikato Univ., Hamilton (New Zealand). Dept. of Earth Sciences.
M. J. Selby, and P. J. Hosking.
J Hydrol (Dunedin). Vol 10, No 2, p 113-119. 1971. Illus.
Identifiers: *Infiltration, Soil moisture, Pasture, Prediction equation, *Pumice soils, Vegetation.

Infiltration measurements on 108 plots in the Otutira experimental basin were carried out. Infiltration is correlated with a large number of soil properties, and the best prediction equation gives an explanation of only 57%. Infiltration is least into soils beneath pasture which have been compacted by land use practices, especially when these soils have low pre-existing soil moistures.--Copyright 1972, Biological Abstracts, Inc.
W73-09069

2H. Lakes

ADAPTATION TO EUTROPHIC CONDITIONS BY LAKE MICHIGAN ALGAE,
Wisconsin Univ., Milwaukee. Dept. of Botany.
For primary bibliographic entry see Field 05C.
W73-08463

CARBON DIOXIDE CONTENT OF THE INTERSTITIAL WATER IN THE SEDIMENT OF GRANE LANGSO, A DANISH LOBELIA LAKE,
Copenhagen Univ. (Denmark). Freshwater Biological Lab.
For primary bibliographic entry see Field 05A.
W73-08555

DISTRIBUTION AND FORMS OF NITROGEN IN A LAKE ONTARIO SEDIMENT CORE,
Department of Energy, Mines and Resources, Burlington (Ontario). Canada Center for Inland Waters.
For primary bibliographic entry see Field 05B.
W73-08563

TECHNIQUES FOR SAMPLING SALT MARSH BENTHOS AND BURROWS,
Georgia Univ., Athens. Dept. of Geology.
For primary bibliographic entry see Field 05A.
W73-08582

THE EFFECTS OF ARTIFICIAL AERATION ON THE DEPTH DISTRIBUTION OF THE CRAYFISH ORCONECTES VIRILIS (HAGEN) IN TWO MICHIGAN LAKES,
Michigan State Univ., East Lansing. Dept. of Fisheries and Wildlife.
For primary bibliographic entry see Field 05C.
W73-08583

A SURVEY OF LENTIC WATER WITH RESPECT TO DISSOLVED AND PARTICULATE LEAD,
Alaska Univ., College. Inst. of Water Resources.
For primary bibliographic entry see Field 05B.
W73-08604

THE ATMOSPHERIC EFFECTS OF THERMAL DISCHARGES INTO A LARGE LAKE,
Argonne National Lab., Ill.
For primary bibliographic entry see Field 05C.
W73-08623

SEASONAL DYNAMICS IN THE DIET OF CERTAIN FISH SPECIES IN LAKE KHASAN (IN RUSSIAN),
L. V. Latysh.
Uch Zap Dal'nevost Univ. Vol 15, No 3, p 71-79. 1971.
Identifiers: Chironomids, Copepods, Daphnids, Diet, *Fish food, Insect, *Lake Khasan (USSR), Lakes, *Minnow, Mysids, Phytoplankton, Seasonal, Smelt, USSR.

The seasonal dynamics of diet in Chinese chebachok, silver smelt, lake minnow and Lagovsky's minnow were studied. The composition of the food was varied and consisted of organisms from 12 groups. No sharp seasonal changes were observed for the chebachok. The main components during all seasons included chironomids, detritus, higher water plants and phytoplankton. Silver smelt fed on mysids, daphnids and copepods in the spring and summer. In the autumn they fed mainly on daphnids. No substantial seasonal dynamics in feeding habits were observed for the minnow. Their food consisted of higher water plants, detritus and insects. Competition for food was practically lacking.--Copyright 1972, Biological Abstracts, Inc.
W73-08656

ORGANIC FILMS ON NATURAL WATERS: THEIR RETRIEVAL, IDENTIFICATION, AND MODES OF ELIMINATION,
Cornell Aeronautical Lab., Inc., Buffalo, N.Y.
For primary bibliographic entry see Field 05B.
W73-08851

FORMS AND DYNAMICS OF SULFUR IN PEAT AND LAKE SEDIMENTS OF BELORUSSIA (FORMY I DINAMIKA SERY V TORFAKH I OSADKAKH OZER BELORUSSII),
Akademiya Navuk BSSR, Minsk. Institut Geokhimii i Geofiziki.
For primary bibliographic entry see Field 02J.
W73-08883

CESIUM KINETICS IN A MONTANE LAKE ECOSYSTEM,
Colorado State Univ., Fort Collins.
For primary bibliographic entry see Field 05B.
W73-08901

SECONDARY PRODUCTION OF SELECTED INVERTEBRATES IN AN EPHEMERAL POND,
Texas A and M Univ., College Station.
For primary bibliographic entry see Field 05C.
W73-08903

THE ECOLOGY OF SOME ARCTIC TUNDRA PONDS,
Missouri Univ., Columbia.
For primary bibliographic entry see Field 05C.
W73-08909

SIGNIFICANCE OF CELLULOSE PRODUCTION BY PLANKTONIC ALGAE IN LACUSTRINE ENVIRONMENTS,
Massachusetts Univ., Amherst.
For primary bibliographic entry see Field 05C.
W73-08917

POLLUTION OF THE 'EL CARPINCHO' POND (PAMPASIC REGION, ARGENTINA) AND ITS EFFECTS ON PLANKTON AND FISH COMMUNITIES,
La Plata Univ. (Argentina). Instituto de Limnologia.
For primary bibliographic entry see Field 05C.
W73-08927

PHOSPHORUS DYNAMICS IN LAKE WATER,
Toronto Univ. (Ontario). Dept. of Zoology.
For primary bibliographic entry see Field 05B.
W73-08931

CESIUM-137 AND STABLE CESIUM IN A HYPEREUTROPHIC LAKE,
Michigan State Univ., East Lansing.
For primary bibliographic entry see Field 05C.
W73-08959

BIOLOGICAL NITROGEN FIXATION IN LAKE MENDOTA,
Wisconsin Univ., Madison.
For primary bibliographic entry see Field 05C.
W73-08962

INITIAL RESPONSES OF PHYTOPLANKTON AND RELATED FACTORS IN LAKE SAMMAMISH FOLLOWING NUTRIENT DIVERSION,
Washington Univ., Seattle.
For primary bibliographic entry see Field 05C.
W73-08973

SOME INFORMATION ON THE CONTAMINATION OF THE VOLGOGRAD WATER RESERVOIR WITH EGGS OF DIPHYLLOBOTHRIUM LATUM, (IN RUSSIAN),
Institute of Medical Parasitology and Tropical Medicine, Moscow (USSR).
For primary bibliographic entry see Field 05C.
W73-09037

HETEROTROPHIC ASSAYS IN THE DETECTION OF WATER MASSES AT LAKE TAHOE, CALIFORNIA,
California Univ., Davis. Dept. of Zoology; and California Univ., Davis. Inst. of Ecology.
For primary bibliographic entry see Field 05C.
W73-09059

STUDIES ON FRESHWATER BACTERIA: ASSOCIATION WITH ALGAE AND ALKALINE PHOSPHATASE ACTIVITY,
Freshwater Biological Association, Windermere (England).
For primary bibliographic entry see Field 05C.
W73-09061

ICE VOLCANOES OF THE LAKE ERIE SHORE NEAR DUNKIRK, NEW YORK, U.S.A.,
State Univ. Coll., Fredonia, N.Y. Dept. of Geology.
For primary bibliographic entry see Field 02C.
W73-09092

2I. Water in Plants

DEGRADATION OF RIPARIAN LEAVES AND THE RECYCLING OF NUTRIENTS IN A STREAM ECOSYSTEM,
Kentucky Water Resources Inst., Lexington.
For primary bibliographic entry see Field 05B.
W73-08471

HYDROPTILA ERAMOSA A NEW CADDIS FLY FROM SOUTHERN ONTARIO (TRICHOPTERA, HYDROPTILIDAE),
Montreal Univ. (Quebec). Dept. of Biological Sciences.
P. P. Harper.
Canadian Journal of Zoology, Vol. 51, No. 3, p 393-394, March 1973. 1 fig, 7 ref.

Descriptors: *Caddisflies; *Aquatic insects, *Systematics, Mature growth stage, Invertebrates, Canada, Speciation.
Identifiers: *Hydroptila eramosa, Trichoptera.

The adult male of Hydroptila eramosa n. sp. is described from Southern Ontario and is briefly compared with other similar species of the 'waubesiana group.' (Holoman-Battelle)
W73-08760

DETERMINATION OF CHLOROPHYLL A AND B IN PLANT EXTRACTS BY COMBINED SUCROSE THIN-LAYER CHROMATOGRAPHY AND ATOMIC ABSORPTION SPECTROPHOTOMETRY,
Texas Tech Univ., Lubbock. Textile Research Center.
For primary bibliographic entry see Field 02K.
W73-08786

INFLUENCE OF REGULATION OF THE LACZANKA RIVER ON THE OCCURRENCE OF HIRUDINEA,
Bialystok Medical Academy (Poland). Dept. of Histology and Embryology.
For primary bibliographic entry see Field 04A.
W73-09019

SOIL PHYSICAL CONDITIONS AFFECTING SEEDLING ROOT GROWTH: I. MECHANICAL IMPEDANCE, AERATION AND MOISTURE AVAILABILITY AS INFLUENCED BY BULK DENSITY AND MOISTURE LEVELS IN A SANDY LOAM SOIL,
B. W. Eavis.
Plant Soil. Vol 36 No 3, p 613-622. 1972 Illus.
Identifiers: Aeration, Bulk, Density, Diffusion, Moisture, Pisum-Sativum-D, *Root growth, *Sandy loam soils, Seedling, Soils.

The role of mechanical impedance, poor aeration and water availability in restricting pea (Pisum sativum L.) seedling root growth in sandy loam soil at 3 bulk densities and 6 matric potentials was studied. Mechanical impedance increased both with bulk density and matric potential. In certain treatments the roots were shorter and thicker as impedance increased but in others shorter, thicker roots were found as impedance decreased and this was attributed to poor aeration. An aeration deficiency index was defined to separate the impedance and aeration effects when the 2 acted in combination. An aeration effect was found in soils having less than 30, 22, and 11% gas-filled pore space at low, medium and high bulk densities, respectively, and the distribution and area of the gas-liquid interface probably influenced diffusion resistance. Effects due to restricted water availability were found only at potentials greater than -3.5 bars, the roots being shorter and thinner as moisture stress increased.--Copyright 1972, Biological Abstracts, Inc.
W73-09029

METHODS OF DETECTING FUNGI IN ORGANIC DETRITUS IN WATER,
Queen's Univ., Belfast (Northern Ireland). Dept. of Botany.
For primary bibliographic entry see Field 07B.
W73-09057

ON THE ECOLOGY OF HETEROTROPHIC MICROORGANISMS IN FRESHWATER,
Queen's Univ., Belfast (Northern Ireland). Dept. of Botany.
D. Park.
Trans Br Mycol Soc. Vol 58, No 2, p 291-299. 1972.
Identifiers: Classification, Ecology, *Heterotrophic microorganisms, *Fungi.

An outline scheme for the ecological classification of heterotrophic microorganisms (fungi) in freshwater is presented in the hope that it may help to indicate some gaps in our knowledge and stimulate a search for precision and definition in future studies.--Copyright 1972, Biological Abstracts, Inc.
W73-09058

COMPARATIVE STUDIES OF PLANT GROWTH AND DISTRIBUTION IN RELATION TO WATERLOGGING: V. THE UPTAKE OF IRON AND MANGANESE BY DUNE AND DUNE SLACK PLANTS,
Trent Univ., Peterborough (Ontario). Dept. of Biology.
R. Jones.
J Ecol. Vol 60, No 1, p 131-139. 1972. Illus.
Identifiers: Agrostis-Stolonifera-M, Carex-Flacca-M, Carex-Nigra-M, *Dune plants, Festuca-Rubra-M, *Iron, *Manganese, Roots, Sand *Waterlogging, Wetness.

The effect of different waterlogging treatments on the uptake of Fe and Mn by Agrostis stolonifera, Festuca rubra, Carex flacca and C. nigra was studied. Waterlogging resulted in increased Fe and Mn contents of the 4 spp., the greatest increase occurring in the roots. Plants grown in slack sand accumulated more Fe but less Mn than plants grown in dune sand. Field collections of C. flacca from dune slope and slack sites were made. Analysis of this material showed that Fe and Mn content increased with the relative wetness of the collection site, paralleling the results of the pot experiment. A possible protection system of shoots by roots to prevent excessive Fe uptake is discussed.--Copyright 1972, Biological Abstracts, Inc.
W73-09063

COMPARATIVE STUDIES OF PLANT GROWTH AND DISTRIBUTION IN RELATION TO WATERLOGGING: VI. THE EFFECT OF MANGANESE ON THE GROWTH OF DUNE AND DUNE SLACK PLANTS,
Trent Univ., Peterborough (Ontario). Dept. of Biology.
R. Jones.
J Ecol. Vol 60, No 1, p 141-145. 1972. Illus.
Identifiers: Agrostis-Stolonifera-M, Carex-Flacca-M, Carex-Nigra-M, *Dune plants, Festuca-Rubra-M, *Manganese, Toxicity, *Waterlogging.

A solution-culture experiment was undertaken to study the effect of Mn on the growth of Agrostis stolonifera, Festuca rubra, Carex flacca and C. nigra. High Mn concentrations resulted in toxicity symptoms in F. rubra and some plants of C. nigra. Growth of F. rubra was reduced by increasing Mn concentrations while that of A. stolonifera was unaffected. Growth of the Carices was promoted by increasing Mn concentrations. These observations are discussed in relation to the ecology of the respective species. (See also W73-09063)--Copyright 1972, Biological Abstracts, Inc.
W73-09064

PROTEIN QUALITY OF SOME FRESHWATER ALGAE,
North Carolina State Univ., Raleigh.
H. E. Schlichting, Jr.
Econ Bot. Vol 25, No 3, p 317-319. 1971.
Identifiers: *Algae, *Protein quality, Water quality, *Amino acids.

Results are presented of experimental culture of 5 species of freshwater algae. Data on amino acid composition are tabulated. Although the yield and protein quality of the mass cultured freshwater algae were poor, certain amino acids were in greater abundance than in other plants.--Copyright 1972, Biological Abstracts, Inc.
W73-09070

2J. Erosion and Sedimentation

HYDRAULIC AND SEDIMENT TRANSPORT STUDIES IN RELATION TO RIVER SEDIMENT CONTROL AND SOLID WASTE POLLUTION AND ECONOMIC USE OF THE BY-PRODUCTS,
Kentucky Water Resources Inst., Lexington.
B. R. Moore.
Available from the National Technical Information Service as PB-220 016, $3.00 in paper copy, $1.45 in microfiche. Research Report No 59, July 1972. 48 p, 18 fig, 2 tab, 5 ref. OWRR A-034-KY (1), 14-31-0001-3217.

Descriptors: *Sediment transport, *Sands, *Coals, *Bed load, *Scour, Ohio River, Dredging, Water pollution control, Hydraulic models, Streamflow, *Kentucky.
Identifiers: Kentucky River, Big Sandy River.

The distribution of sediments and the conditions of sediment transport were studied in the Kentucky, Big Sandy and Ohio Rivers. Sand and coal were in transport at different flow velocities for the rivers. The principal source of the coal is natural erosion. Deposition of these sediments was a function of the flow conditions at a particular locality. The flow conditions of transport of the sediments were also studied in flumes, as were the hydraulic conditions in model dredge holes, to determine the feasibility of trapping sediment. The conditions of scour and fill were compared with known conditions in a dredge hole in the Ohio River. Flow records from gaging stations were analyzed to determine the periods of sediment transport. Solid waste pollutants can be trapped in dredge holes in some conditions of flow. (Knapp-USGS)
W73-08468

FLUVIAL SEDIMENT IN DOUBLE CREEK SUBWATERSHED NO. 5, WASHINGTON COUNTY, OKLAHOMA,
Geological Survey, Oklahoma City, Okla.
G. A. Bednar, and T. E. Waldrep.
Geological Survey open-file report, 1973. 38 p, 4 fig, 11 tab, 5 ref.

Descriptors: *Sediment yield, *Small watersheds, *Oklahoma, *Reservoir silting, *Trap efficiency, Retention, Water balance.
Identifiers: *Double Creek Watershed (Okla).

Fluvial sediment was measured in Double Creek subwatershed No. 5 in Washington County, Oklahoma. The subwatershed includes 2.39 square miles, and it receives runoff from approximately 5% of the total area of the Double Creek watershed. Approximately three-fourths (47,000 acre-feet) of precipitation is lost by evaporation and transpiration, and a small amount is lost by deep subsurface percolation. Of the total sediment load, 59% was discharged from the reservoir during four major outflow periods representing 34% of the outflow days. Most runoff and sediment yield occur from March through June; 53% of the water discharged and 63% of the sediment yield occurred during this 4-month period. The average annual yield of fluvial sediment from watershed No. 5 was 607 tons per square mile. A total of 21,370 tons of fluvial sediment was transported into reservoir No. 5 and a total of 19,930 tons was deposited. The computed trap efficiency of reservoir No. 5 is 93%. (Knapp-USGS)
W73-08491

THE CONCENTRATION OF COPPER, LEAD, ZINC AND CADMIUM IN SHALLOW MARINE SEDIMENTS, CARDIGAN BAY (WALES),
University Coll. of North Wales, Menai Bridge. Marine Science Labs.
A. S. G. Jones.
Marine Geology, Vol 14, No 2, p M1-M9, February 1973. 2 fig, 3 tab, 15 ref.

Descriptors: *Bottom sediments, *Copper, *Lead, *Zinc, *Cadmium, Bays, Provenance, Distribution patterns, Clays, Sands, Trace elements, Heavy metals.
Identifiers: *Cardigan Bay (Wales).

The concentration of copper, lead, zinc and cadmium in the sediments of the southern Cardigan Bay area were determined. Comparative results are presented for the Pleistocene sediments and the Aberystwyth Grits (Silurian) which outcrop along the shore line. The sediments from the Rheidol and Ystwyth rivers are strongly enriched in lead and zinc. The Pleistocene sediments are enriched in cadmium by a factor of 10 with respect to the seabed sediments in this part of Cardigan Bay. Copper is found in the acid-soluble fraction, 75% of the zinc occurs in the acid-soluble fraction, and 60% of the total cadmium occurs in the acid-soluble fraction. The charted distributions of the four elements did not show any clear dispersal patterns. The minimum concentrations of the four elements are found in the medium to fine sands. (Knapp-USGS)
W73-08501

OBSERVATIONS OF SOME SEDIMENTARY PROCESSES ACTING ON A TIDAL FLAT,
New Hampshire Univ., Durham. Dept. of Earth Sciences; and New Hampshire Univ., Durham. Jackson Estuarine Lab.
F. E. Anderson.
Marine Geology, Vol 14, No 2, p 101-116, February 1973. 11 fig, 12 ref.

Descriptors: *Sediment transport, *Sedimentation, *Suspended load, *Intertidal areas, *New Hampshire, Mud flats, Littoral drift, Waves (Water), Tidal streams, Settling velocity, Sampling.
Identifiers: *Tidal flats.

On tidal flats, sediment resuspension occurs more readily on the floodtide than the ebb. The concentration of suspended sediment follows the water mass distribution and is affected to a lesser degree by tidal currents and small amplitude waves. Deposition occurs during slack water shortly after high tide primarily in the bottom regime (15 cm); it is probably related to coarser particle sedimentation. The water mass distribution was not a simple rise and fall perpendicular to the bottom contours but rather followed a slow clockwise gyre. The net effect on the suspended sediments was to impart a longshore component of drift to the suspended load during the tidal cycle. In order to examine these sedimentary processes, eighteen-foot valves were placed in a small tidal cove in southern New Hampshire. Transport of suspended sediment was determined by comparing concentrations at 15 and 30 cm above the tidal flats throughout a tidal cycle. (Knapp-USGS)
W73-08502

A COMPARISON OF SUSPENDED PARTICULATE MATTER FROM NEPHELOID AND CLEAR WATER,
Lamont-Doherty Geological Observatory, Palisades, N.Y.
M. B. Jacobs, E. M. Thorndike, and M. Ewing.
Marine Geology, Vol 14, No 2, p 117-128, February 1973. 2 fig, 2 plate, 2 tab, 24 ref.

Descriptors: *Suspended load, *Sea water, *Optical properties, *Turbidity, Particle size, Mineralogy.
Identifiers: Nepheloid layers (Sea water).

The total count of suspended particles is a basic difference between water samples from nepheloid layers of the North American and Brazil basins and samples from the clearer water over the Mid-Atlantic Ridge in both the North and South Atlantic. The nepheloid layer of the North American basin has four times and the Brazil basin three times the particle density of clearer water over the mid-ocean ridge. A greater percentage of particles larger than 2 microns prevails in nepheloid water (85-96%) as compared to a range of 76-87% in the clear water. Non-opaque mineral grains form the major constituent. (Knapp-USGS)
W73-08503

A SANDWAVE FIELD IN THE OUTER THAMES ESTUARY, GREAT BRITAIN,
Unit of Coastal Sedimentation, Taunton (England).
For primary bibliographic entry see Field 02L.
W73-08504

THE RESIDUA SYSTEM OF CHEMICAL WEATHERING: A MODEL FOR THE CHEMICAL BREAKDOWN OF SILICATE ROCKS AT THE SURFACE OF THE EARTH,
Guelph Univ. (Ontario). Dept. of Land Resource Science.
For primary bibliographic entry see Field 02K.
W73-08511

UNIT STREAM POWER AND SEDIMENT TRANSPORT,
Illinois Univ., Urgana.
For primary bibliographic entry see Field 08B.
W73-08513

DISTRIBUTION AND FORMS OF NITROGEN IN A LAKE ONTARIO SEDIMENT CORE,
Department of Energy, Mines and Resources, Burlington (Ontario). Canada Center for Inland Waters.
For primary bibliographic entry see Field 05B.
W73-08563

RIVER ECOLOGY AND MAN.
For primary bibliographic entry see Field 06G.
W73-08664

GEOCHEMISTRY AND DIAGENESIS OF TIDAL-MARSH SEDIMENT, NORTHEASTERN GULF OF MEXICO,
Geological Survey, Washington, D.C.
V. E. Swanson, A. H. Love, and I. C. Frost.
Available from GPO, Washington, D.C. 20402, Price $0.55. Geological Survey Bulletin 1360, 1972. 83 p, 11 fig, 7 tab, 81 ref.

Descriptors: *Sediments, *Geomorphology, *Tidal marshes, *Florida, Gulf of Mexico, Sedimentology, Particle size, Sediment distribution, Organic matter, Inorganic compounds, Water chemistry, Chemical analysis, Salinity, Coasts, Estuaries, Tidal effects, Sediment transport, Hydrologic data, Data collections.
Identifiers: *Taylor County (Fla), *Dixie County (Fla).

This investigation was limited to one tidal-marsh area, a belt 1 to 5 miles wide extending 80 miles along the northeastern Gulf of Mexico, from the Aucilla River to the Suwannee River, Fla. Only the near offshore, tidal-stream, and tidal-marsh sediments, with their similarities and differences, are discussed. On the basis of grain size and amount of organic matter, the sediment in the tidal marsh is classified as peaty sandy mud, carbonaceous muddy sand, and relatively clean sand. The range in organic matter content is 15 to 40%, 4 to 15%, and 0.1 to 4%, respectively. Of the abundant organic matter in the tidal marsh sediment 80% is humic material derived from the inland swamp-forest areas and delivered to the Gulf of Mexico by streams. Metals that are enriched in the sediment because of the abundant organic matter are iron, manganese, cobalt, chromium, copper, molybdenum, nickel, and vanadium. Except for iron, each is present as less than 0.1% of the sample. (Woodard-USGS)
W73-08730

EFFECT OF GROUNDWATER ON STABILITY OF SLOPES AND STRUCTURES ERECTED ON THEM ON THAWING OF FROZEN SOILS,
For primary bibliographic entry see Field 02C.
W73-08734

SUSPENDED-SEDIMENT YIELDS OF NEW JERSEY COASTAL PLAIN STREAMS DRAINING INTO THE DELAWARE ESTUARY,
Geological Survey, Trenton, N.J.
L. J. Mansue.
Geological Survey open-file report, 1972. 26 p, 5 fig, 3 tab, 9 ref.

Descriptors: *Sediment transport, *Sediment yield, *Sedimentation, *Delaware River, Data collections, Tributaries, Streams, Estuaries, Bays, Sampling, Particle size, Suspended load, Navigable waters.
Identifiers: *Delaware Bay.

An investigation was begun in 1965 by the U.S. Geological Survey in cooperation with the U.S. Army, Corps of Engineers, for information on sediment transport in the Delaware River basin in relation to the maintenance of navigable channels in the river's estuarine areas. A daily sediment-sampling program at streamflow-gaging stations on Crosswicks Creek, Cooper River, Maurice River, and Raccoon Creek was established. Three partial-record stations were established on the Pennsauken, Big Timber, and Mantua Creeks in 1970 to complete the areal coverage. Records at Delaware River at Trenton and McDonalds Branch in Lebanon State Forest were available also for use in this study. Suspended sediment transported by streams draining into the Delaware estuary and Bay from New Jersey is related to areal variations in geology, physiography, and land use. It is estimated that sediment contribution from the Delaware River mainstem is 700,000 tons per year; that of streams draining the Inner Coastal Plain, 200,000 tons per year; and that of streams draining the Outer Coastal Plain, 9,000 tons per year. Thus, of the approximate 910,000 tons per year transported into the Delaware estuary and Bay, roughly 20% is contributed by the Coastal Plain tributaries. (Woodard-USGS)
W73-08742

FREEZING EFFECTS ON ARCTIC BEACHES,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
For primary bibliographic entry see Field 02C.
W73-08751

GEOMORPHIC COASTAL VARIABILITY, NORTHWESTERN AUSTRALIA,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
L. D. Wright, J. M. Coleman, and B. G. Thom.
Available from NTIS, Springfield, Va. 22151, as AD-755 154. Price $3.00 printed copy; $1.45 microfiche. Louisiana State University Coastal Studies Bulletin No 7, p 35-64, Technical Report 129, January 1973. 17 fig, 1 tab, 12 ref. ONR-GP Contract N00014-69-A-0211-0003.

Descriptors: *Geomorphology, *Coasts, *Australia, *Tides, *Waves (Water), Erosion, Beaches, Beach erosion, Surf, Littoral drift, Sedimentation, Sediment transport, Structural geology, Tropical regions, Climates.
Identifiers: *Coastal geomorphology.

The coastline from Darwin, Northern Territory, Australia, to the western limit of the Joseph Bonaparte Gulf illustrates multiclass coastal variability within a zonal process environment characterized by an extreme tidal range and a tropical monsoon climate. Ten discrete geomorphic provinces were identified, each possessing a distinct coastal landscape and reflecting varying relative process contributions. The numerous coastal forms and combinations of forms are functions more of local circumstances than of the zonal environment. Because of the feedback between form and process variations, in resistance factors such as geological structure, coastline orientation, and offshore slope, together with variations in local rates of sediment supply create appreciable spatial variability in the nearshore process environment and consequently in the relative contribution of different process factors to the coastal geomorphology. (Knapp-USGS)
W73-08752

PRELIMINARY RIVER-MOUTH FLOW MODEL,
Louisiana State Univ., Baton Rouge. Dept. of Chemical Engineering.
W. R. Waldrop.
Available from NTIS, Springfield, Va. 22151, as AD-755 155, Price $3.00 printed copy; $1.45 microfiche. Louisiana State University Coastal Studies Bulletin No 7, p 67-92, Technical Report 130, January 1973. 11 fig, 27 ref. ONR-GP Contract N00014-69-A-0211-0003.

Descriptors: *Sedimentation, *Deltas, *Numerical analysis, Turbulent flow, Sediment transport, Equations, Mississippi River, Deposition (Sediments), Salinity, Saline water intrusion.

The interaction of the river with its receiving basin near the mouth dominates deltaic growth. The transport phenomena controlling the interaction are extremely complicated. The mixing region involves three-dimensional, viscous, turbulent, three-component, two-phase, incompressible flow. The flow field is steady for a given river stage and tide condition. Turbidity of the river has an insignificant effect upon the fluid mechanics; hence, solution for the transport and deposition of suspended material may be decoupled from the solution of the flow field, and the complications involved in solving two-phase flow can be avoided. Equations describing the fluid mechanics of the region defy analytical solution, but a numerical technique is adequate. Results for two- and three-dimensional test cases are given. A technique is described by which a computed three-dimensional fluid velocity field can be used to calculate the deposition of suspended material from the river. (Knapp-USGS)
W73-08753

CEMENTATION IN HIGH-LATITUDE DUNES,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
H. H. Roberts, W. Ritchie, and A. Mather.
Available from NTIS Springfield, Va. 22151, as AD-755 156. Price $3.00 printed copy; $1.45 microfiche. Louisiana State University Coastal Studies Bulletin No 7, p 95-112, Technical Report 131 January 1973.

Descriptors: *Diagenesis, *Sands, *Dunes, *Calcite, Carbonate rocks, Sedimentology, Carbonates, Calcium carbonate.
Identifiers: *Scotland, *Cementation (Diagenesis).

Highly calcareous dune sands are currently being cemented along many coasts of Northern Scotland. These Holocene landforms are stabilized by low Mg-calcite cements with fabrics and geochemical characteristics suggesting precipitation in the vadose meteoric diagenetic environment. Although extensive early carbonate diagenesis is not generally associated with high-latitude environments, this coastal zone cementation is a

widespread phenomenon in Northern Scotland. (Knapp-USGS)
W73-08754

PERIODICITIES IN INTERFACIAL MIXING,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
For primary bibliographic entry see Field 02L.
W73-08756

AN AIR-LIFT FOR SAMPLING FRESHWATER BENTHOS,
Reading Univ. (England). Dept. of Zoology.
For primary bibliographic entry see Field 07B.
W73-08795

BOTTOM TOPOGRAPHY AND SEDIMENT TEXTURE NEAR THE COLUMBIA RIVER MOUTH,
Washington Univ., Seattle. Dept. of Oceanography.
For primary bibliographic entry see Field 02L.
W73-08827

DISTRIBUTION OF ORGANIC CARBON IN SURFACE SEDIMENT, NORTHEAST PACIFIC OCEAN,
Washington Univ., Seattle. Dept. of Oceanography.
For primary bibliographic entry see Field 02L.
W73-08828

THE DISTRIBUTION OF MICROBIOGENIC SEDIMENT NEAR THE MOUTH OF THE COLUMBIA RIVER,
Shoreline Community Coll., Seattle, Wash. Div. of Science.
For primary bibliographic entry see Field 02L.
W73-08829

THE RELATIONSHIP BETWEEN RAINFALL FREQUENCY AND AMOUNT TO THE FORMATION AND PROFILE DISTRIBUTION OF CLAY PARTICLES,
Illinois Univ., Urbana. Dept. of Agronomy.
For primary bibliographic entry see Field 02G.
W73-08875

FORMS AND DYNAMICS OF SULFUR IN PEAT AND LAKE SEDIMENTS OF BELORUSSIA (FORMY I DINAMIKA SERY V TORFAKH I OSADKAKH OZER BELORUSSII),
Akademiya Navuk BSSR, Minsk. Institut Geokhimii i Geofiziki.
K. I. Lukashev, V. A. Kovalev, A. L. Zhukhovitskaya, V. A. Generalova, and A. A. Sokolovskaya.
Litologiya i Poleznyye Iskopayemyye, No 3, p 34-47, May-June 1972. 1 fig, 6 tab, 24 ref.

Descriptors: *Sedimentation, *Diagenesis, *Peat, *Lake sediments, *Sulfur, Sulfur compounds, Sulfates, Sulfides, Mineralogy, Inorganic compounds, Organic compounds, Organic matter, Oxidation, Reduction (Chemical), Bogs, Marshes, Coals, Chemical analysis, Geochemistry, Seasonal.
Identifiers: *USSR, *Belorussia, Mineralization.

Diagenesis of sulfur in peat and lake sediments of Belorussia is considered in relation to the seasonal dynamics of the environment and the differences in the supply of mineral and organic matter. Sulfur compounds are present in peat and lake sediments in five forms: monosulfide, free, sulfate, disulfide, and organic. In peat, organic compounds and disulfies predominate, while sulfates and free sulfur are of secondary importance. In lake sediments, the main forms of sulfur are sulfates and monosulfides, followed by disulfides and organic compounds. The quantity of free sulfur in sediments is too small to be determined quantitatively. (Josefson-USGS)
W73-08883

1971 WATER RESOURCES DATA FOR NEW YORK: PART TWO, WATER QUALITY RECORDS.
Geological Survey, Albany, N.Y.
For primary bibliographic entry see Field 07C.
W73-08890

DECOMPOSITION OF OIL POLLUTANTS IN NATURAL BOTTOM SEDIMENTS,
Rutgers - The State Univ., New Brunswick, N.J.
For primary bibliographic entry see Field 05B.
W73-08911

THE DISTRIBUTION, SUBSTRATE SELECTION AND SEDIMENT DISPLACEMENT OF COROPHIUM SALMONIS (STIMPSON) AND COROPHIUM SPINICORNE (STIMPSON) ON THE COAST OF OREGON,
Oregon State Univ., Corvallis.
For primary bibliographic entry see Field 05B.
W73-08912

A. THE ROLE OF LICHENS IN ROCK WEATHERING AND SOIL FORMATION. B. MERCURY IN SEDIMENTS,
Wisconsin Univ., Madison.
For primary bibliographic entry see Field 05B.
W73-08930

SORPTION OF COPPER ON LAKE MONONA SEDIMENTS - EFFECT OF NTA ON COPPER RELEASE FROM SEDIMENTS,
Wisconsin Univ., Madison. Water Chemistry Program.
For primary bibliographic entry see Field 05B.
W73-08946

SUSPENDED-SEDIMENT YIELD AND EROSION FROM MOUNTAINOUS AREAS OF SOVIET CENTRAL ASIA (FORMIROVANYE STOKA VZVESHENNYKH NANOSOV I SNYV S GORNOY CHASTI SREDNEY AZII),
Sredneaziatskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Tashkent (USSR).
O. P. Shcheglova.
Trudy, No 60 (75), Leningrad, 1972. 228 p, 52 fig, 54 tab, 175 ref.

Descriptors: *Sediment yield, *Sediment discharge, *Suspended load, *Erosion, *Mountains, Glaciers, Ice, Snowpacks, Snowmelt, Runoff, Discharge (Water), Rainfall, Raindrops, Air temperature, Erosion rates, Turbidity currents, Provenance, Streams, Watersheds (Basins), Maps.
Identifiers: *USSR, *Soviet Central Asia, Rainwash, Differential erosion.

Methods to separate suspended-sediment yield of mountain streams in Soviet Central Asia into genetic components are based on observations carried out at hydrometeorological stations in the Uzbek, Kirgiz, and Tadzhik Republics and in southern Kazakhstan. Absolute and relative values of the components of suspended-sediment yield from rainfall, snowmelt, and glaciers are evaluated, and total suspended-sediment yield of the rivers of Soviet Central Asia is compiled. Relationships are established between the sources of sediments in mountain streams and absolute basin elevation, and, for the small and receding glaciers of the region, between the rate of glacial erosion and glacier runoff. A map constructed for the Chirchik River Basin in Tashkent Oblast graphically illustrates differential erosion over a basin surface. (Josefson-USGS)
W73-09000

A DEVICE FOR COLLECTING IN-SITU SAMPLES OF SUSPENDED SEDIMENT FOR MICROSCOPIC ANALYSIS,
Johns Hopkins Univ., Baltimore, Md. Chesapeake Bay Inst.
For primary bibliographic entry see Field 07B.
W73-09056

MATHEMATICAL SIMULATION OF THE TURBIDITY STRUCTURE WITHIN AN IMPOUNDMENT,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 05G.
W73-09081

CLAY MINERALOGY OF QUATERNARY SEDIMENTS IN THE WASH EMBAYMENT, EASTERN ENGLAND,
Imperial Coll. of Science and Technology, London (England). Dept. of Geology.
H. F. Shaw.
Marine Geology, Vol 14, No 1, p 29-45, January 1973. 4 fig, 9 tab, 11 ref.

Descriptors: *Clay minerals, *Intertidal areas, *Estuaries, *Tidal marshes, Clays, Illite, Montmorillonite, Kaolinite, Provenance, Mineralogy, Erosion, Sedimentation.

The Wash, England, is an area of extensive intertidal flat sedimentation. Samples were examined from the intertidal zone of deposition and also from areas that are probable sources of the sediments being deposited. The mineralogy of the clay fractions of the sediments is dominated by illite, mixed layer illite-montmorillonite, montmorillonite, kaolinite, and chlorite, with only minor amounts of quartz and calcite. There is little or no significant variation in the relative proportions of the clay minerals in the modern intertidal flat sediments. However, variations are found between the relative proportions of clay minerals present in the probable source materials and the intertidal flat sediments. The main sources of the intertidal sediments are the floors of the North Sea and the Wash, and the exposed coasts of Lincolnshire and Norfolk. Erosion and redeposition of the intertidal flat material is a further important source of clay sediments. (Knapp-USGS)
W73-09083

2K. Chemical Processes

DEVELOPMENT AND TESTING OF A DOUBLE-BEAM ABSORPTION SPECTROGRAPH FOR THE SIMULTANEOUS DETERMINATION OF DIFFERENT CATIONS IN WATER,
Kentucky Water Resources Inst., Lexington.
W. H. Dennen.
Available from the National Technical Information Service as PB-220 017, $3.00 in paper copy, $1.45 in microfiche. Research Report No 53, October 1972. 9 p, 4 fig, 1 tab. OWRR A-036-KY (1), 14-31-0001-3517.

Descriptors: *Water analysis, *Spectroscopy, *Spectrophotometry, *Chemical analysis, Photometry, Analytical techniques, Instrumentation, Spectrometers.
Identifiers: *Double-beam spectrography.

A double-beam absorption spectrographic analysis system using a dc arc multielement source was tested for water analysis. The optical system design brings analytical and reference beams together to illuminate the upper and lower portions of the spectrograph slit. However, a dc arc will not serve as a multielement source for the intended purposes because of excessive thermal broadening of emission lines. A direct excitation dc arc method can be used for the rapid determination of some cations in water. Measurements for Mg, Fe, Ni, Al, Cu, and Si are comparable to known detec-

tion levels. This analytical method is very fast and cheap and could well be applied in reconaissance studies. In operation, spectrographically pure electrodes are simply soaked in water, allowed to dry, and arced at 6 amps for 40 secs. (Knapp-USGS)
W73-08469

DETERMINATION OF TRACE ELEMENTS IN WATER UTILIZING ATOMIC ABSORPTION SPECTROSCOPY MEASUREMENT,
Kentucky Water Resources Inst., Lexington.
For primary bibliographic entry see Field 05A.
W73-08470

SALINITY VARIATIONS IN SEA ICE,
Dartmouth Coll., Hanover, N.H. Dept. of Earth Sciences.
For primary bibliographic entry see Field 02C.
W73-08474

RADIOCHEMICAL MONITORING OF WATER AFTER THE CANNIKIN EVENT, AMCHITKA ISLAND, ALASKA, JULY 1972,
Geological Survey, Lakewood, Colo.
For primary bibliographic entry see Field 05B.
W73-08479

THE CONCENTRATION OF COPPER, LEAD, ZINC AND CADMIUM IN SHALLOW MARINE SEDIMENTS, CARDIGAN BAY (WALES),
University Coll. of North Wales, Menai Bridge. Marine Science Labs.
For primary bibliographic entry see Field 02J.
W73-08501

THE INFLUENCE OF IRON AND ALUMINUM HYDROXIDES ON THE SWELLING OF NA--MONTMORILLONITE AND THE PERMEABILITY OF A NA-SOIL,
Reading Univ. (England). Dept. of Soil Science.
For primary bibliographic entry see Field 02G.
W73-08509

THE RESIDUA SYSTEM OF CHEMICAL WEATHERING: A MODEL FOR THE CHEMICAL BREAKDOWN OF SILICATE ROCKS AT THE SURFACE OF THE EARTH,
Guelph Univ. (Ontario). Dept. of Land Resource Science.
W. Chesworth.
Journal of Soil Science, Vol 24, No 1, p 69-81, March 1973. 6 fig, 2 tab, 35 ref.

Descriptors: *Weathering, *Silicates, Chemical degradation, Hydrolysis, Oxidation, Mineralogy, Iron, Magnesium, Aluminum, Soil formation.

The residua system of chemical weathering is the chemical sink towards which the bulk of earth's surface materials trend during weathering. Chemically the system is defined in terms of four major components: SiO2, Al2O3, Fe2O3, H2O. Evidence is derived from relative solubilities of components under earth-surface conditions, from experiments in which weathering environments have been simulated in the laboratory, and from field studies of rocks and their weathered mantle. The residua system can be used as a framework to construct mineral facies diagrams showing assemblages of the commonest earth-surface minerals that occur within it: quartz, gibbsite, goethite, kaolinite, halloysite. In a qualitative manner the facies diagrams can then be interpreted in terms of the partial pressure of water and the temperature. The usefulness of this approach in systematizing studies of soil genesis is illustrated with reference to the weathering of granite. (Knapp-USGS)
W73-08511

GAS CHROMATOGRAPH INJECTION SYSTEM,
National Aeronautics and Space Administration, Moffett Field, Calif. Ames Research Center.
For primary bibliographic entry see Field 07B.
W73-08528

A REAPPRAISAL: CORRELATION TECHNIQUES APPLIED TO GAS CHROMATOGRAPHY,
Warren Spring Lab., Stevenage (England). Control Engineering Div.
For primary bibliographic entry see Field 05A.
W73-08535

A UNIQUE COMPUTER CENTERED INSTRUMENT FOR SIMULTANEOUS ABSORBANCE AND FLUORESCENCE MEASUREMENTS,
Michigan State Univ., East Lansing. Dept. of Chemistry; and Michigan State Univ., East Lansing. Dept. of Biochemistry.
For primary bibliographic entry see Field 07B.
W73-08541

ON-LINE COMPUTER SYSTEM FOR AUTOMATIC ANALYZERS,
Food and Drug Administration, Chicago, Ill.
For primary bibliographic entry see Field 07C.
W73-08568

APPLICATION OF A LABORATORY ANALOG--DIGITAL COMPUTER SYSTEM TO DATA ACQUISITION AND REDUCTION FOR QUANTITATIVE ANALYSES,
Department of Agriculture, Agassiz (British Columbia). Research Station.
For primary bibliographic entry see Field 07C.
W73-08569

AUTOMATED KJELDAHL NITROGEN DETERMINATION--A COMPREHENSIVE METHOD FOR AQUEOUS DISPERSIBLE SAMPLES,
Miles Lab., Inc., Elkhart, Ind. Marschall Div.
For primary bibliographic entry see Field 05A.
W73-08596

FLOW PROGRAMMING IN COMBINED GAS CHROMATOGRAPHY--MASS SPECTROMETRY,
McDonnell Douglas Research Labs., St. Louis, Mo.
M. A. Grayson, R. L. Levy, and C. J. Wolf.
Analytical Chemistry, Vol 45, No 2, p 373-376, February 1973. 5 fig.

Descriptors: Methodology, Separation techniques, Pollutant identification, Flow rates, Gas chromatography, Mass spectrometry, Chemical analysis, Organic compounds.
Identifiers: *GC-mass spectrometry, *FPGC-mass spectrometry, *Flow programming, Flow programmed gas chromatography, Temperature programmed gas chromatography, Mass spectra, Carrier gas, Molecular effusion separator.

The use of flow programming gas chromatography (FPGC) in combination with GC-mass spectrometry has been studied using a Bendix time-of-flight mass spectrometer coupled to a Beckman gas chromatograph with a molecular effusion type separator. An Analabs flow programmer was used to program the flow rate. The ion source pressure was monitored with a Bayard Alpert ionization gauge. In order to have a molecular separator that operates efficiently over a broad range of carrier gas flow rates the latter of these 3 approaches were used: The outlet of the GC column is directly connected to the molecular separator and the entire column effluent is introduced to the separator; the outlet of the GC column is connected to a 'flow splitter', thus allowing only a fixed flow to enter the separator while the excess flow is vented; the separator is optimized for the highest flow rate encountered in the program. Using the latter, flow programming with GC/MS produced no change in yield during analysis. During an analysis of n-octane, the relatively low background current observed with FPGC (in contrast to TPGC) illustrated the utility of the extension of the useful range of the chromatographic column while minimizing the effect of 'column bleed'. The intensity of the peaks obtained during the elution of n-octane with TPGC indicates the advantage of FPGC-MS in obtaining the net mass spectrum. (Holoman-Battelle)
W73-08597

APPLICATION OF A WAVELENGTH SCANNING TECHNIQUE TO MULTI-ELEMENT DETERMINATIONS BY ATOMIC FLUORESCENCE SPECTROMETRY,
Imperial Coll. of Science and Technology, London (England). Dept. of Chemistry.
For primary bibliographic entry see Field 05A.
W73-08598

GLACIERS AND NUTRIENTS IN ARCTIC SEAS,
Maine Dept. of Sea and Shore Fisheries, West Boothbay Harbor. Fisheries Research Station.
S. Apollonio.
Science, Vol 180, No 4085, p 491-493, May 4, 1973. 1 fig, 11 ref. ONR N00014-70-A-0219-0001.

Descriptors: *Nutrients, *Glaciers, *Fjords, *Arctic, *Canada, Phosphates, Silicates, Nitrates, Scour, Sediments.

Significantly higher concentrations of nitrate and silicate were found in glaciated South Cape Fiord than in unglaciated Grise Fiord, in the Canadian Arctic, or in adjacent Jones Sound. No significant differences in phosphate concentrations were found. Glacial activity apparently enriches the concentrations of those nutrients most critically limiting for arctic phytoplankton requirements. (Knapp-USGS)
W73-08726

INFRARED REFLECTANCE OF SULFATE AND PHOSPHATE IN WATER,
Missouri Univ., Kansas City.
For primary bibliographic entry see Field 05A.
W73-08728

GROUNDWATER RESOURCES OF WASHINGTON COUNTY, TEXAS,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 04B.
W73-08739

GROUNDWATER RESOURCES OF NAVARRO COUNTY, TEXAS,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 04B.
W73-08740

SALINE GROUNDWATER RESOURCES OF MISSISSIPPI,
Geological Survey, Jackson, Miss.
For primary bibliographic entry see Field 07C.
W73-08750

STANDARD POTENTIALS OF THE SILVER/SILVER-IODIDE ELECTRODE IN AQUEOUS MIXTURES OF ETHYLENE GLYCOL AT DIFFERENT TEMPERATURES AND THE THERMODYNAMICS OF TRANSFER OF HYDROGEN HALIDES FROM WATER TO GLYCOLIC MEDIA,
Jadavpur Univ., Calcutta (India). Dept. of Chemistry.

For primary bibliographic entry see Field 05A.
W73-08757

THE ERROR IN MEASUREMENTS OF ELECTRODE KINETICS CAUSED BY NONUNIFORM OHMIC-POTENTIAL DROP TO A DISK ELECTRODE,
California Univ., Los Angeles. School of Engineering and Applied Science.
W. H. Tiedemann, J. Newman, and D. N. Bennion.
Journal of the Electrochemical Society, Vol. 120, No. 2, p 256-257, February 1973. 1 fig.

Descriptors: *Electrochemistry, Electrodes, Electric currents.
Identifiers: *Disk electrodes, *Errors, *Electrode kinetics, *Current distribution, Potential drop, Accuracy.

Prior studies have shown that nonuniform ohmic, potential drop with rotating disk electrodes will lead to errors in determining kinetic parameters unless special corrections are applied. Linear electrode kinetics have been used to assess the magnitude of the effect. The apparent surface overpotential is taken to be that measured by a reference electrode with the ohmic potential being determined by interruption of the current. Three reference electrode positions--edge, intermediate, and far away--were used. The results show that serious errors in the measurement of electrode kinetic parameters can result from an electrode which is characterized by a nonuniform current distribution. The errors associated with nonuniform current distribution are smallest when the reference electrode is located far from the disk. However, decreasing the error in this manner increases the ohmic drop which must be compensated for by an interrupter technique. Under certain experimental conditions, the compensated ohmic potential can be as large as 90 percent of the total measured overpotential, with a consequent decrease in the accuracy of the surface overpotential. (Little-Battelle)
W73-08758

REVERSED-PHASE FOAM CHROMATOGRAPHY. REDOX REACTIONS ON OPEN-CELL POLYURETHANE FOAM COLUMNS SUPPORTING TETRACHLOROHYDROQUINONE,
Eotvos Lorand Univ., Budapest (Hungary). Inst. of Inorganic and Analytical Chemistry.
For primary bibliographic entry see Field 05A.
W73-08782

ION-EXCHANGE FOAM CHROMATOGRAPHY. PART I. PREPARATION OF RIGID AND FLEXIBLE ION-EXCHANGE FOAMS,
Eotvos Lorand Univ., Budapest (Hungary). Inst. of Inorganic and Analytical Chemistry.
T. Braun, O. Bekeffy, I. Haklits, K. Kadar, and G. Majoros.
Analytica Chimica Acta, Vol 64, No 1, p 45-54, March 1973. 3 fig, 7 tab, 8 ref.

Descriptors: *Construction, Strontium radioisotopes, Pollutant identification, Cation exchange, Separation techniques.
Identifiers: *Ion exchange foam chromatography, *Ion exchange foams, *Foaming, Sr-85, Chloromethylation, Amination, Radiation grafting, Polyurethane foams, Polystyrene foams, Polymerization.

In order to be able to apply the principles of foam chromatography to ion-exchange processes, preparative methods for open-cell ion-exchange foams were investigated. Homogeneous ion-exchange foams were prepared by introducing ion-exchange groups on previously prepared phenol-formaldehyde, polyurethane and polyethylene foams. The maximum capacity of the produced sulfonated phenol-formaldehyde cation-exchange foams was 1.85 meq/g, that of the syrene-polyurethane interpolymer anion-exchange foams was 2.2 meq/g. Weak carboxylic ion-exchange foams were prepared by radiation grafting of polyurethane and polyethylene foams; the maximum capacity of these foams was 4.02 meq/g. Heterogeneous ion-exchange foams were prepared by foaming a fine powder of a commercially available cation exchanger with the precursors of open-cell polyether-type polyurethane foam. The capacity of such a foam containing 26 percent ion-exchange powder was 1.0 meq/g. The kinetics of the cation-exchange process on the heterogeneous foams was measured with Sr-85. (Holoman-Battelle)
W73-08783

ION EXCHANGE IN AQUEOUS AND IN AQUEOUS-ORGANIC SOLVENTS. PART I. ANION-EXCHANGE BEHAVIOUR OF ZR, NB, TA AND PA IN AQUEOUS HCL-HF AND IN HCL-HF-ORGANIC SOLVENT,
Technische Universitaet, Munich (West Germany). Institut fuer Radiochemie.
For primary bibliographic entry see Field 05A.
W73-08784

DETERMINATION OF CHLOROPHYLL A AND B IN PLANT EXTRACTS BY COMBINED SUCROSE THIN-LAYER CHROMATOGRAPHY AND ATOMIC ABSORPTION SPECTROPHOTOMETRY,
Texas Tech Univ., Lubbock. Textile Research Center.
H. Loewenschuss, and P. J. Wakelyn.
Analytica Chimica Acta, Vol 63, No 1, p 230-235, January 1973. 1 fig, 3 tab, 11 ref.

Descriptors: *Methodology, Separation techniques, Reliability, Plant pigments, Solvent extractions, Magnesium, Physical properties.
Identifiers: *Sucrose thin layer chromatography, *Atomic absorption spectrophotometry, *Chlorophyll a, *Chlorophyll b, *Plant extracts, Sample preparation, Sensitivity, Spinach, Pheophytin a, Pheophytin b, Sample size.

A rapid, accurate technique has been described for determining chlorophyll a and b in plant extracts. A plant sample was extracted with MeOH containing MgCO3 at zero degrees for an hour with constant stirring. The MgCO3 was added in order to prevent the chlorphylls from decomposing to pheophytins. The extract was filtered, and a portion evaporated in a stream of N2 to yield a concentrate for pigment separation by sucrose one-dimensional thin-layer chromatography. The Mg content of those separated compounds was determined by AAS, and was used to determine the ratio of chlorophyll a to b. With this system, chlorophyll a and b are well separated from each other and from other pigments as well. The chlorophyll ratio obtained compared favorably with the published value and spectroscopically determined values. The sample size and sensitivity of the method are limited only by the atomic-absorption spectrophotometer available (0.001 microgram Mg/ml can be measured). The proposed method therefore seems preferable to the normal published techniques since it is fast, reliable, and more convenient. The proposed method can also be used to determine total chlorophyll content of a material. (Holoman-Battelle)
W73-08786

THE PREPARATION AND ANALYTICAL EVALUATION OF A NEW HETEROGENEOUS MEMBRANE ELECTRODE FOR CADMIUM (II),
Rome Univ. (Italy). Istituto di Chimica Analitica.
For primary bibliographic entry see Field 05A.
W73-08787

SEPARATION OF MATRIX ABSORPTION AND ENHANCEMENT EFFECTS IN THE DETERMINATION OF SULFUR IN SEA WATER BY X-RAY FLUORESCENCE,
Hawaii Univ., Honolulu. Dept. of Chemistry; and Hawaii Inst. of Geophysics, Honolulu.
For primary bibliographic entry see Field 05A.
W73-08789

A RADIOREAGENT METHOD FOR THE DETERMINATION OF TRACES OF BISMUTH,
Savannah State Coll., Ga. Dept. of Chemistry.
For primary bibliographic entry see Field 05A.
W73-08790

SPECTROPHOTOMETRIC DETERMINATION OF P.P.B. LEVELS OF LONG-CHAIN AMINES IN WATERS AND RAFFINATES,
Australian Atomic Energy Commission Research Establishment, Lucas Heights.
For primary bibliographic entry see Field 05A.
W73-08793

CHEMICAL BUDGET OF THE COLUMBIA RIVER,
Oregon State Univ., Corvallis. Dept. of Oceanography.
For primary bibliographic entry see Field 02L.
W73-08821

WORKING SYMPOSIUM ON SEA-AIR CHEMISTRY: SUMMARY AND RECOMMENDATIONS,
Rhode Island Univ., Kington. Graduate School of Oceanography.
R. A. Duce, W. Stumm, and J. M. Prospero.
Journal of Geophysical Research, Vol 77, No 27, p 5059-5061. September 20, 1972. 2 ref. NSF GA 30550.

Descriptors: *Air-water interfaces, *Water chemistry, *Sea water, Conferences, Geochemistry, Water cycle.
Identifiers: *Sea-air chemistry.

The Oceanography Section of the National Science Foundation and the American Meteorological Society sponsored the Working Symposium on Sea-Air Chemistry held at Fort Lauderdale, Florida, January 31 through February 3, 1972. Thirty-three papers were presented on a wide variety of subjects associated with sea-air transport processes and the chemistry of the marine atmosphere. The solutions to many problems in air pollution and water pollution as well as a complete assessment of the geochemical cycles of many elements are critically dependent on a better understanding of sea-surface phenomena. Specific areas of investigation include the chemistry of the sea-surface microlayer and its modifications by man, as well as physical and chemical processes involved in bubble formation and bursting and the subsequent production of atmospheric sea-salt nuclei. Also of vital importance is a much more complete understanding of the chemistry of the marine atmosphere in general, including particle-gas interactions and the contribution of continentally derived particulates. (Knapp-USGS)
W73-08850

METAL-ION CONCENTRATIONS IN SEA-SURFACE MICROLAYER AND SIZE-SEPARATED ATMOSPHERIC AEROSOL SAMPLES IN HAWAII,
Hawaii Univ., Honolulu. Dept. of Chemistry.
D. R. Barker, and H. Zeitlin.
Journal of Geophysical Research, Vol 77, No 27, p 5076-5086, September 20, 1972. 1 fig, 3 tab, 36 ref.

Descriptors: *Air-water interfaces, *Aerosols, *Water chemistry, *Sampling, *Water analysis, Geochemistry, Sodium, Potassium, Calcium, Magnesium, Strontium, Copper, Iron, Zinc,

Phosphorus, Nitrates, Organic matter, Boundary processes, *Hawaii, Sea water.

Sea-surface microlayer and marine atmosphere samples from Hawaii were analyzed for sodium, potassin, calcium, magnesium, strontium, copper, iron, zinc, total carbon, total phosphorus, and reactive nitrate. Chemical compositions and ion ratios of most samples differ, often drastically, from normal seawater data. These samples generally have considerably higher total carbon, phosphorus, and nitrate concentrations than samples taken at the same site by at 0.6-meter depth. Microlayer samples are also found to be enriched to a small extent in some alkaline earth metals and to a much larger extent for the transition metals, copper, iron, and zinc. The transition metals were also found to be proportionately more organically associated in the microlayer samples. Aerosol samples studies are enriched in most metals relative to sodium and to the metal sodium ratio found in seawater. Average enrichment values for the transition metals on smaller aerosols approach and exceed 3 and 4 orders of magnitude. Organic coating materials on the aerosols are more concentrated on the smaller aerosols. (Knapp-USGS)
W73-08852

GEOCHEMISTRY OF OCEAN WATER BUBBLE SPRAY,
Negev Inst. for Arid Zone Research, Beersheba (Israel).
M. R. Bloch, and W. Luecke.
Journal of Geophysical Research, Vol 77, No 27, p 5100-5105, September 20, 1972. 3 fig, 1 tab, 22 ref.

Descriptors: *Air-water interfaces, *Water chemistry, *Sea water, *Aerosols, *Bubbles, Sodium, Potassium, Chlorides, Sulfates, Geochemistry, Boundary processes, Adsorption.

The salts in rain, snow, and dew derive from ocean bubble spray. The difference in ion ratios between the spray and the bulk of the solution that is sprayed is in agreement with the requirements of the Gibbs adsorption isotherm if the spray is derived from the surface layer of the bulk solution. Inorganic salts dissolved in ocean water are depleted in the surface of the ocean because the surface tension of their solution rises with their concentration. The gradient of this rise has a characteristic value for each salt and is independent of temperature. For sodium chloride this gradient is 1.85, and for potassium chloride it is 1.50. These and other oceanic salts were tested for changes in ion ratio in the bubble spray of their mixtures. Experiments were performed with seawater and artificial solutions at temperatures ranging from 25 degrees to 130 degrees C. The Gibbs theory predicts quantitatively the ratio changes found in bubble spray at equilibrium conditions only (for ocean environment near 100% humidity). When the sprayed surface is evaporated, the ratio shift is enhanced in favor of potassium ions compared with sodium ions. If condensation occurs at the time of bubble spray generation, however, this change in ratio is diminished. (Knapp-USGS)
W73-08853

FLAME PHOTOMETRIC ANALYSIS OF THE TRANSPORT OF SEA SALT PARTICLES,
National Oceanic and Atmospheric Administration, Hilo, Hawaii. Mauna Loa Observatory.
B. A. Bodhaine, and R. F. Pueschel.
Journal of Geophysical Research, Vol 77, No 27, p 5106-5115, September 20, 1972. 8 fig, 25 ref.

Descriptors: *Aerosols, *Salts, *Water chemistry, *Flame photometry, Analytical techniques, Sea water, Water analysis.
Identifiers: *Flame scintillation photometry.

Flame scintillation spectral analysis was used for the determination of the size distribution of sodium-containing particles in oceanic aerosols. Near the seashore, these aerosols are identical to sea salt particles and amount to approximately 5% of the total Aitken particle count. Measurements made at Mauna Loa Observatory (above the trade wind inversion) indicate a similar size distribution. However, only about 1% of the concentration is transported through the inversion, and removal efficiency tends to favor the removal of larger particles (Knapp-USGS)
W73-08854

VARIATION IN IONIC RATIOS BETWEEN REFERENCE SEA WATER AND MARINE AEROSOLS,
Centre National de la Recherche Scientifique, Gif-sur-Yvette (France). Centre des Faibles Radioactivites.
R. Chesselet, and P. Baut-Menard.
Journal of Geophysical Research, Vol 77, No 27, p 5116-5131, September 20, 1972. 1 fig, 9 tab, 37 ref.

Descriptors: *Aerosols, *Water chemistry, *Geochemistry, *Dusts, *Sea water, Sampling, Water analysis, Chemical analysis, Antarctic, Potassium, Sodium, Air-water interfaces, Salts, Spectrophotometry.

Atmospheric particles were collected over the western Mediterranean, North Atlantic, and Norwegian Sea by air filtration and cascade impactors. The ratios of concentrations of K to Na exhibited marked variation and were greater than the reference ratio in bulk seawater. These concentration ratios are related to chemical fractionation in aerosols produced by the breaking of bubbles at the sea surface. In strong support of this fractionation concept are data based on: laboratory and in situ experiments with artifically produced aerosols; high-volume air sampling over the Antarctic Ocean, where terrigenous dusts are scarce; and coastal region sampling where silicon, aluminum, iron, and potassium provide a corrective index for potassium-rich terrigenous dust concentrations. The Cl/Na ratios measured resemble the seawater values, which could indicate that an enrichment of potassium takes place rather than a depletion of sodium. The Ca/Na ratios often follow the K/Na ratios and suggest identical enrichment of calcium. The enrichments seem to preferentially affect particles of small size (Knapp-USGS)
W73-08855

MOLECULAR ASPECTS OF AQUEOUS INTERFACIAL STRUCTURES,
Miami Univ., Coral Gables, Fla. Dept of Chemistry.
For primary bibliographic entry see Field 01B.
W73-08856

EXPERIMENTAL SEA SALT PROFILES,
National Center for Atmospheric Research, Boulder, Colo.
E. R. Frank, J. P. Lodge, Jr., and A. Goetz.
Journal of Geophysical Research, Vol 77, No 27, p 5147-5151, September 20, 1972. 10 fig, 1 tab, 5 ref.

Descriptors: *Aeroslos, *Water chemistry, *Pacific Ocean, *Salts, Chlorides, Sulfates, Winds, Sampling, Particle size, Electron microscopy, Chemicl analysis, Bubbles.

A series of determinations was made of the concentration of airborne chloride particles at heights between 1 and 15 meters above the ocean surface. Samples were taken in the general area between Santa Barbara, California, and Santa Catalina Island. There is no clear gradient in concentration over the height interval measured. Number count, geometric mean, and geometric standard deviation were all extremely similar in al heights. Geometric standard deviation was small, rarely exceeding 2.0, and was often as low as 1.5. Geometric mean diameter, expressed as the diameter of an equivalent sphere of pure sodium chloride, was approximately 2 microns. Concentrations ranged over a wide span from a few thousand to a few million particles per cubic meter. Because of the complex geography of the San Pedro channel and adjacent waters, there was no obvious relationship between local wind velocity and particle concentration. A contributing factor may be the difficulty in making measurements in a small boat at wind velocities that cause significant local surface generation of salt particles. Simultaneous collections of smaller particles for electron microscopy showed phosphate to be a consistent minor ingredient, and sulfuric acid and sulfates to be surprisingly prevalent. (Knapp-USGS)
W73-08857

STRUCTURE OF SEA WATER AND ITS ROLE IN CHEMICAL MASS TRANSPORT BETWEEN THE SEA AND THE ATMOSPHERE,
R. A. Horne.
Journal of Geophysical Research, Vol 77, No 27, p 5170-5176, September 20, 1972. 5 fig, 37 ref.

Descriptors: *Water structure, *Air-water interfaces, *Ion transport, *Mass transfer, *Sea water, Water chemistry, Aerosols, Bubbles, Diffusion, Surface tension, Sodium, Potassium, Vicosity, Hydration, Hydrogen bonding.

Understanding interfacial phenomena associated with liquid water can be aided by a molecular model that envisions the pure bulk liquid as a mixture of flickering clusters and more or less monomeric water. Seawater solutes alter the local water structure into at least two structurally different types of hydration atmospheres, coulombic hydration surrounding ions and polar solutes and hydrophobic hydration enveloping nonpolar solutes and solute segments. The water structure (vicinal water) of the liquid boundary layer at the air-sea interface resembles the hydrophobic hydration, and it may preferentially exclude ionic species and thereby give rise to the Na-K fractionation observed in nature. (Knapp-USGS)
W73-08858

EFFECT OF VARIOUS SALTS ON THE SURFACE POTENTIAL OF THE WATER-AIR INTERFACE,
Naval Research Lab., Washington, D.C.
N. L. Jarvis.
Journal of Geophysical Research, Vol 77, No 27, p 5177-5182, September 20, 1972. 3 fig, 18 ref.

Descriptors: *Chemical potential, *Air-water interfaces, *Sea water, *Aerosols, *Water chemistry, Sulfates, Carbonates, Chlorides, Nitrates, Bromine, Iodine, Potassium, Ammonia, Sodium, Lithium, Barium, Strontium, Magnesium.

Studies of the formation and chemical composition of marine aerosols strongly suggest that some ions may be preferentially excluded from the sea-air interface. Measurements of the surface potential of electrolyte solutions are a useful technique for studying in situ ion exclusion. In a series of surface potential measurements the potential changes due to a variety of Na salts, at a solution concentration of 2 moles, were in the order of decreasing potential: SO4 > CO3 > CH3COO > Cl> NO3 >Br > I > SCN. In general the anion with the smaller hydration energy gave the greater decrease. Regular decreases were observed for the group IA and IIA chlorides at a given concentration: K ± NH4> Li and Ba > Sr > Mg. The sign of the surface potential change as well as the magnitude appears to be determined primarily by the anion; this suggests that the anion are preferentially associated with the water molecules at the surface. (Knapp-USGS)
W73-08859

OUR KNOWLEDGE OF THE PHYSICO--CHEMISTRY OF AEROSOLS IN THE UNDISTURBED MARINE ENVIRONMENT,
Max Planck-Institut fur Chemie, Mainz (West Germany).
For primary bibliographic entry see Field 05B.
W73-08860

ADSUBBLE PROCESSES: FOAM FRACTIONATION AND BUBBLE FRACTIONATION,
Cincinnati Univ., Ohio. Dept of Chemical and Nuclear Engineering.
For primary bibliographic entry see Field 05G.
W73-08861

FLOW PATTERNS IN BREAKING BUBBLES,
California Univ., Santa Barbara. Marine Science Inst.
F. MacIntyre.
Journal of Geophysical Research, Vol 77, No 27, p 5211-5228, September 20, 1972. 19 fig, 1 tab, 62 ref.

Descriptors: *Bubbles, *Mass transfer, *Flow, Sea water, Water chemistry, Foaming, Air-water interfaces, Waves (Water), Ocean waves, Surface tension, Viscosity, Aerosols.

Fluid flow during bubble collapse is driven by high pressure gradients associated with high surface curvature. Experiments suggest that the driving force is at a maximum at the surface and preferentially accelerates the surface in boundary-layer shear flow down the cavity wall. An irrotational solitary capillary ripple precedes the main toroidal rim, transporting mass along the surface at about 90% of its phase velocity. The convergence of this flow creates opposed axial jets. About 20% of the boundary-layer thickness flows into the upward jet. The material in the top jet drop was originally spread over the interior bubble surface at an average thickness of some 0.05% of the bubble diameter. (Knapp-USGS)
W73-08862

ELEMENT ENRICHMENT IN ORGANIC FILMS AND FOAM ASSOCIATED WITH AQUATIC FRONTAL SYSTEMS,
Delaware Univ., Newark, College of Marine Studies.
K. H. Szekielda, S. L. Kupferman, V. Klemas, and D. F. Polis.
Journal of Geophysical Research, Vol 77, No 27, p 5278-5282, September 20, 1972. 5 fig, 2 tab, 10 ref.

Descriptors: *Air-water interfaces, *Organic matter, *Foam fractionation, *Ocean circulation, *Trace elements, Chromium, Copper, Iron, Mercury, Lead, Zinc, Ocean currents, Sediments, Suspended load, Water chemistry.
Identifiers: *Fronts (Aquatic).

Surface slicks and foam were collected at frontal convergence zones in Delaware Bay by a method that resulted in the acquisition of gram-sized samples. Concentrations of Cr, Cu, Fe, Hg, Pb, and Zn in these samples were found to be higher by more than 4 orders of magnitude than those in mean ocean water. Inorganic matter comprises more than 80% of the film material. The primary inorganic constituent is quartz. The levels of trace metal enrichment in the slicks and foam are in reasonable agreement with the values predicted from measurements in the surface microlayer in Narragansett Bay. (Knapp-USGS)
W73-08864

A LABORATORY STUDY OF IODINE ENRICHMENT ON ATMOSPHERIC SEA-SALT PARTICLES PRODUCED BY BUBBLES,
Hawaii Univ., Honolulu. Dept of Chemistry.
F. Y. B. Seto, and R. A. Duce.
Journal of Geophysical Research, Vol 77, No 27, p 5339-5349, September 20, 1972, 2 fig, 4 tab, 24 ref.

Descriptors: *Aerosols, *Iodine, *Air-water interfaces, Water chemistry, Sea water, Laboratory tests, Sampling, Salts.

A laboratory model ocean-atmosphere study was undertaken to investigate the mechanisms causing iodine enrichment of up to 500 (compared to the iodine content of seawater) on atmospheric sea-salt particles produced by bubbles in the sea. Experiments were run both by using I-131 tracer in seawater and by using iodine analysis by neutron activation in untreated fresh seawater. Particles produced by bubbling in the model ocean were separated into size fractions with a cascade impactor. Gaseous iodine was collected on activated charcoal. Organically bound iodine probably accounts for an initial iodine enrichment on the particles and may also explain the characteristic U shape of the curve of iodine enrichment versus particle size curve. Gaseous iodine is also a major factor in determining the iodine enrichment on marine atmospheric particulate matter. (Knapp-USGS)
W73-08865

ON THE FLOTATION OF PARTICULATES IN SEA WATER BY RISING BUBBLES,
Naval Research Lab., Washington, D.C.
G. T. Wallace, Jr., G. I. Loeb, and D. F. Wilson.
Journal of Geophysical Research, Vol 77, No 27, p 5293-5301, September 20, 1972. 1 fig, 3 tab, 45 ref.

Descriptors: *Foam fractionation, *Bubbles, *Air-water interfaces, *Sea water, *Water chemistry, Microorganisms, Algae, Aquatic bacteria, Trace elements, Flotation.

A simple batch-type foam separation apparatus was used to determine the degree to which rising bubbles could scavenge and enrich the surface layers of a column of seawater with particulate matter. By comparing the amount of particulated in the original material with that in later recovered material in the enriched surface layers of the column, recoveries were determined for various samples of natural and laboratory origin. Recovery of particulates in natural samples was consistently high, whereas recovery of particulates from unicellular algal cultures varied, the apparent parameter governing the degree of recovery being the age of the culture in question. Bacteria and phytoplankton are known to concentrate trace elements to values larger by orders of magnitude than their ambient sea water concentrations. In turn, bacteria and phytoplankton can be ejected into the atmosphere by the action of breaking bubbles. It seems possible that the trace element enrichment observed in atmospheric sea salt particles may at least in part be due to the biological activity of microorganisms in the sea. (Knapp-USGS)
W73-08866

FRACTIONATION OF THE ELEMENTS F, CL, NA, AND K AT THE SEA-AIR INTERFACE,
Naval Research Lab., Washington, D.C.
P. E. Wilkniss, and D. J. Bressan.
Journal of Geophysical Research, Vol 77, No 27, p 5307-5315, September 20, 1972. 3 fig, 3 tab, 13 ref.

Descriptors: *Aerosols, *Air water interfaces, *Water chemistry, *Sea water, Flourides, Chlorides, Sodium, Potassium, Dusts.

The sea-air interface ion fractionation of F, Cl, Na, and K was studied in the field and the laboratory. Laboratory results show negative enrichement of fluoride and chloride versus Na and a postive enrichment of K. The same results were found in samples that were collected under marine conditions. The fractionation in a marine sea salt aerosol is F ± -0.62, Cl ± +0.12, and K ± +0.40 normalized to Na. The chemistry of marine precipitation is quite different from these values and approaches more the chemistry of the tropospheric background aerosol or of a continental aerosol with the exception of chloride values. (Knapp-USGS)
W73-08867

SMALLER SALT PARTICLES IN OCEANIC AIR AND BUBBLE BEHAVIOR IN THE SEA,
Hawaii Univ., Honolulu. Dept of Oceanography.
A. H. Woodcock.
Journal of Geophysical Research, Vol 77, No 27, p 5316-5321, September 20, 1972. 4 fig, 27 ref.

Descriptors: *Bubbles, *Aerosols, *Water chemistry, Sea water, Sampling, Salts, Air-water interfaces.

Observations of the number and size of the smaller salt particles in the air over Hawaiian and Alaskan seas are presented. Differences in the particle distributions at the two locations are related to differences in the behavior of air bubbles of various sizes near and on a seawater surface. The relationships suggest that a break in the curves among particles of 10 to the -13 to -14 power grams marks a zone of transition from a bubble jet to a bubble film source of droplets and that the Alaskan waters are a relatively poor source of particles. (Knapp-USGS)
W73-08868

RAPID CHANGES IN THE FLUORIDE TO CHLORINITY RATIO SOUTH OF GREENLAND,
Bedford Inst., Dartmouth (Nova Scotia). Atlantic Oceanographic Lab.
J. M. Bewers, G. R. Miller, Jr., D. R. Kester, and T. B. Warner.
Nature Physical Science, Vol 242, No 122, p 142-143, April 30, 1973. 2 fig, 14 ref.

Descriptors: *Chlorides, *Fluorides, *Sea water, *Water chemistry, *Atlantic Ocean, Provenance, Ocean circulation, Ocean currents, Oceanography.
Identifiers: *Greenland.

Fluoride to chlorinity ratios were measured at six stations southeast of Greenland. There were no anomalous fluoride concentrations present at the time these samples were collected. It is unlikely that earlier reported anomalies were the result of sampling or analytical error. Therefore, if the earlier existence of the anomalies is accepted, the present work shows that they are not a steady-state feature of the deep waters of this part of the North Atlantic. The rapid implied change in the deepwater chemistry of this region can only have been caused by an episodic injection of fluoride; but neither volcanism nor mineral dissolution can be responsible. Mineral dissolution rates do not change rapidly enough to explain the temporal changes in water chemistry. Moreover, since the underlying sediments in the area are predominantly calcareous the amounts of fluoride available are insufficient. Therefore, further information regarding the geochemistry of fluoride in the marine environment is required. (Knapp-USGS)
W73-08869

WATER MOVEMENT AND CALICHE FORMATION IN LAYERED ARID AND SEMIARID SOILS,
Nevada Univ., Reno.
For primary bibliographic entry see Field 02G.
W73-08872

ANALYSIS OF MULTIDIMENSIONAL LEACHING,
Commonwealth Scientific and Industrial Research Organization, Wembley (Australia). Div. of Soils.
For primary bibliographic entry see Field 02G.
W73-08873

EFFECT OF FLOODING ON THE EH, PH, AND CONCENTRATIONS OF FE AND MN IN SEVERAL MANITOBA SOILS,
Manitoba Univ., Winnipeg. Dept. of Soil Science.

For primary bibliographic entry see Field 02G.
W73-08877

PROBLEMS AND TECHNIQUES OF KARST RESEARCH (PROBLEMY IZUCHENIYA KARSTA I PRAKTIKA),
N. A. Gvozdetskiy.
Izdatel'stvo 'Mysl', Moscow, 1972. 392 p.

Descriptors: *Karst, *Karst hydrology, *Investigations, *Analytical techniques, Geology, Geomorphology, Geochemistry, Groundwater, Rocks, Carbonate rocks, Limestones, Dolomite, Caves, Climatology, Vegetation, Soils, Construction, Mining, Mapping, Bibliographies.
Identifiers: *USSR, Karst topography, Karst springs, Karst lakes.

Studies were made of the geochemical, geological, geographical, and practical aspects of karst phenomena and processes in Soviet Russia and other parts of the world. Features characteristic of karst regions are described, and problems involved in the classification and regionalization of karst are discussed. A comprehensive 50-page bibliography of Soviet and foreign literature on karst is presented containing over 800 references arranged alphabetically according to authors and by chapter. (Josefson-USGS)
W73-08881

SULFATE WATERS IN NATURE (SUL'FATNYYE VODY V PRIRODE),
Gidrokhimicheskii Institut, Novocherkassk (USSR).
Ye. V. Posokhov.
Gidrokhimicheskiye Materialy, Vol 58, Leningrad, 1972. 168 p.

Descriptors: *Water chemistry, *Water analysis, *Sulfates, Calcium sulfate, Sodium sulfate, Gypsum, Anhydrite, Sulfur, Sulfides, Salts, Mineralogy, Precipitation (Atmospheric), Rivers, Surface waters, Subsurface waters, Groundwater, Confined water, Aquifers, Water types.
Identifiers: *USSR, Magnesium sulfate, Mineralization.

Processes of sulfate formation in natural waters were investigated in atmospheric precipitation, rivers, lakes, ponds, and other surface waters. Special attention is given to genesis of sulfates in subsurface waters, including confined water, cold mineral water, thermal water, and mine water. Also examined are the origin and distribution of hydrochemical zones of sulfate-bearing waters and the role of sulfates in the evolution of the chemical composition of sea water. (Josefson-USGS)
W73-08882

1971 WATER RESOURCES DATA FOR NEW YORK: PART TWO, WATER QUALITY RECORDS.
Geological Survey, Albany, N.Y.
For primary bibliographic entry see Field 07C.
W73-08890

CALCIUM ION-SELECTIVE ELECTRODE IN WHICH A MEMBRANE CONTACTS GRAPHITE DIRECTLY,
Lever Bros. Co., Edgewater, N.J. Research and Development Div.
A. Ansaldi, and S. I. Epstein.
Analytical Chemistry, Vol 45, No 3, p 595-596, March 1973. 1 fig, 1 tab, 10 ref.

Descriptors: *Calcium, *Calibrations, *Design, *Magnesium, *Aqueous solutions, Nickel, Zinc, Lead.
Identifiers: *Ion selective electrodes, *Chemical interference, *Sensitivity, Barium, Selectivity coefficients, Detection limits.

An ion-selective electrode for calcium was constructed as follows. A membrane 0.5 mm thick was prepared by mixing liquid ion-exchanger and polyvinylchloride and pouring into a polypropylene cap from a 50-ml centrifuge tube. The resulting membrane was cemented to a piece of Tygon tubing. A graphite rod (5 mm dia x 90 mm) was force fitted into the tubing so as to contact the membrane. A copper lead wire was press fitted into the graphite. The performance of the electrode was compared with that of the Orion calcium electrode in calcium solutions prepared by dissolving calcium carbonate in hydrochloric acid, neutralizing excess acid, and diluting with distilled water. The eletrodes were calibrated using these solutions. Selectivity coefficients were determined by additions of Mg, Ba, Ni, Zn, and Pb ions. The results showed that electrode potential varied linearly with the log of calcium activity in the range of 0.1 to 0.00001 M Ca (2 plus). The electrode was also sensitive below 0.00001 M. Both the PVC/graphite and Orion electrodes were useful in the pH range 5.5 to 10.5 at Ca (2 plus) concentrations as low as 0.0001 M. The PVC/graphite electrode was less sensitive to Na than the Orion. Responses were similar for Ni and Zn, less for Mg and Ba with the PVC/graphite electrode, and more for Pb with the PVC/graphite electrode. (Little-Battelle)
W73-08910

INFLUENCE OF PH ON THE RESPONSE OF A CYANIDE ION SELECTIVE MEMBRANE ELECTRODE,
Rome Univ. (Italy). Istituto di Chimica Analitica.
For primary bibliographic entry see Field 05A.
W73-08916

DESIGN AND EVALUATION OF A LOW COST RECORDING SPECTROPOLARIMETER,
Cleveland State Univ., Ohio. Dept. of Chemistry.
For primary bibliographic entry see Field 07B.
W73-08919

(I) OBSERVATIONS OF SMALL PHOTOCURRENTS ON THE DROPPING MERCURY ELECTRODE AND (II) A STUDY OF THE ADSORPTION OF TRIFLUOROMETHYL SULFONATE ON MERCURY,
Georgetown Univ., Washington, D.C.
For primary bibliographic entry see Field 05A.
W73-08926

PULSE POLAROGRAPHY IN PROCESS ANALYSIS. DETERMINATION OF FERRIC, FERROUS, AND CUPRIC IONS,
North American Rockwell Corp., Thousand Oaks, Calif. Science Center.
For primary bibliographic entry see Field 05A.
W73-08952

SOLID STATE ION-SELECTIVE MICROELECTRODES FOR HEAVY METALS AND HALIDES,
State Univ. of New York, Buffalo. Dept. of Chemistry.
For primary bibliographic entry see Field 05A.
W73-08954

GAS-SOLID CHROMATOGRAPHY OF ORGANIC ACIDS AND AMINES USING STEAM CONTAINING FORMIC ACID OR HYDRAZINE HYDRATE AS CARRIER GASES,
Tokyo Univ. of Education (Japan). Inst. for Optical Research.
For primary bibliographic entry see Field 05A.
W73-08956

HYDROGEOLOGY AND KARST STUDIES (GIDROGEOLOGIYA I KARSTOVEDENIYE).
Perm State Univ. (USSR). Inst. of Karst Studies and Peleology.

Vol 4, 1971. 232 p.

Descriptors: *Karst, *Karst hydrology, *Hydrogeology, *Investigations, Analytical techniques, Geology, Structural geology, Fissures (Geologic), Rocks, Carbonate rocks, Limestones, Dolomite, Caves, Groundwater, Subsurface drainage, Erosion, Alluvium, Water types, Reservoirs, Aerial photography.
Identifiers: *USSR, *Karst topography, Karst lakes, Paleokarst, Tectonics.

This collection of 29 papers published by Perm' State University is grouped under four subject headings: karst studies (12 papers); karst hydrogeology and hydrology (9 papers); hydrogeology (5 papers); and geodynamic processes (3 papers). Among the topics discussed are: (1) aerial photographic interpretation of karst areas; (2) karst as an indicator of development of platform structures; (3) fissuration as a condition essential to deep karst development in carbonate rocks; (4) paleokarst development in Carboniferous deposits of the Bashkir and Tatar Republics; (5) buried karst in the Lower Volga region; (6) carbonate breccia in gypsum karst of Dagestan; (7) salt karst on shores of the Toktogul Reservoir (Kirgizia); (8) practical importance of Siberian karst; (9) karst of the Altay Territory; (10) investigation methods and use of karst in Czechoslovakia; (11) characteristics of Cuban karst; (12) geological activity of waters in karst regions of Perm' Oblast; (13) composition of karst-lake deposits in Perm' Oblast; (14) character and intensity of chemical denudation in mountainous regions of the Crimea; (15) hydrogeological signigicance of clastic karst in the northern Yuryuzano-Sylva depression (Perm' Oblast); (16) use of aqualungs in hydrogeological investigations of karst regions; (17) effects of tectonic structures on subsurface drainage in zone of active water exchange; (18) freshwater and saline-water resources in the Cisural region of Perm' Oblast; (19) exogenic geodynamic processes in the zone of Kama River reservoirs; and (20) dynamic features of alluvium. (Josefson-USGS)
W73-08998

DIFFUSION COEFFICIENT OF I-IONS IN SATURATED CLAY SOIL,
For primary bibliographic entry see Field 02G.
W73-09030

BONDING OF WATER TO ALLOPHANE,
Department of Scientific and Industrial Research, Lower Hutt (New Zealand). Soil Bureau.
N. Wells, and R. J. Furkert.
Soil Sci. Vol 113, No 2, p 110-115, 1972. Illus.
Identifiers: *Allophane, *Bonding, Clusters, *Endothermy, Hydrogen, Physical properties, Infrared.

Modification of the physical properties of allophane by mechanical working has been related to changes induced in the bonding of water. A working action introduced a sharp low temperature endothermic peak. The water in worked samples was able to undergo H--O-H bending at 1620 cm-1 to a greater extend than water in unworked allophane and to a slightly greater extent than in water alone. Worked and unworked allophane taken to wilting point in a pressure membrane apparatus held over 100% by weight (on 110C wt.) in a form that gave a broad high temperature endothermic peak and an IR (H-O-H bending/-O-H stretching) absorbance ratio similar to that given by the unworked, undried allophane. Rewetting to the natural water content did not reproduce the single broad high temperature peak. Rewet allophane could have 3 endothermic peaks: a very

sharp peak at 25C given by surplus free water; a sharp peak at 35C given by single water molecules H bonded to clay surfaces; and a broad peak at 60 to 70C given by H bonded clusters of H2O molecules cited in microspores. IR evidence suggested that the worked material had the added water mainly present as free water while the unworked allophane had mostly re-incorporated the added water. The unworked allophane taken only part way to wilting point could recover its clusters of water molecules, but the worked material did not recover and had free water present. The large quantity of water present in natural allophane is held in H bonded clusters of H2O molecules. Mechanically working to produce a slurry breaks the clusters and distributes the water as singly linked molecules on the clay surface.--Copyright 1972, Biological Abstracts, Inc.
W73-09041

INTERLAYER HYDRATION AND THE BROADENING OF THE 10 A X-RAY PEAK IN ILLITE,
Battelle-Northwest, Richland, Wash.
For primary bibliographic entry see Field 02G.
W73-09042

DETAILED TEMPERATURE STRUCTURE OF THE HOT BRINES IN THE ATLANTIS II DEEP AREA (RED SEA),
Bundesanstalt fur Bodenforschung, Hanover, (West Germany).
M. Schoell, and M. Hartmann.
Marine Geology, Vol 14, No 1, p 1-14, January 1973. 5 fig, 4 tab, 13 ref.

Descriptors: *Brines, *Thermal water, *Geothermal studies, *Hot springs, Water temperature, Thermal springs, Thermal stratification, Sampling, Sounding.
Identifiers: *Red Sea.

Semi-continuous temperature profiles in the Atlantis II Deep of the Red Sea reveal a detailed picture of the flow of the recently detected 59 deg C brine. This newly heated brine originates in the southwest basin of the Atlantic II Deep and is spreading to its other basins. In some depressions in the basins, relicts of the previous 56 deg C brine were detected as a bottom layer. In the north basin restricted inflow of the 59 deg C brine led to a maximum temperature of only 58.2 deg C. Detailed bathymetry of the Chain Deep area revealed the existence of three nearly or completely separate brine pools with differing temperature profiles; maximum temperatures recorded are 46.2 and 52.4 deg C, respectively. (Knapp-USGS)
W73-09099

2L. Estuaries

ESTUARINE POLLUTION, A BIBLIOGRAPHY.
Office of Water Resources Research, Washington, D.C.

Available from the National Technical Information Service as PB-220 119, $12.50 in paper copy, $1.45 microfiche. Water Resources Scientific Information Center, Report WRSIC 73-205, April 1973, 477 p, 324 ref.

Descriptors: *Aquatic environment, *Bibliographies, *Estuaries, *Estuarine environment, *Eutrophication, Algae, Benthic fauna, Dissolved oxygen, Environmental effects, Nutrients, Pesticides, Phytoplankton, Radioactivity, Salinity, Thermal pollution, Water pollution effects, Water pollution sources, Water quality control.
Identifiers: *Estuarine pollution.

This bibliography containing 324 abstracts and references, is another in a series of planned bibliographies in water resources to be produced from the information base comprising SELECTED WATER RESOURCES ABSTRACTS (SWRA). At the time of search for this bibliography, the data base had 50,631 abstracts covering SWRA through December 15, 1972 (Volume 5, Number 24). The report contains an author index and extensive subject indexes.
W73-08451

SOME OBSERVATIONS OF TURBULENT FLOW IN A TIDAL ESTUARY,
Naval Research Lab., Washington, D.C. Ocean Sciences Div.
C. M. Gordon, and C. F. Dohne.
Journal of Geophysical Research, Vol 78, No 12, p 1971-1978, April 20, 1973. 6 fig, 26 ref.

Descriptors: *Turbulent flow, *Estuaries, *Tidal effects, *Time series analysis, Tidal streams, Currents (Water), Current meters, Flowmeters, Vortices, Turbulence, Chesapeake Bay.

Time series of tidal current velocities were measured at various depths in an estuary with a pivoted vane current meter. The velocity data were analyzed to obtain mean longitudinal and vertical currents along with their respective turbulent fluctuations. Correlation of the fluctuation components allowed direct measurements of Reynolds stresses, which ranged from near zero at the surface to about 5 dynes/sq cm close to the bottom at 7 meters. Variation of the turbulent kinetic energy with shear stress was approximately linear. The longitudinal and vertical components of the turbulent kinetic energy changed differently with depth and were related to tidal phase. (Knapp-USGS)
W73-08494

THE CONCENTRATION OF COPPER, LEAD, ZINC AND CADMIUM IN SHALLOW MARINE SEDIMENTS, CARDIGAN BAY (WALES),
University Coll. of North Wales, Menai Bridge. Marine Science Labs.
For primary bibliographic entry see Field 02J.
W73-08501

OBSERVATIONS OF SOME SEDIMENTARY PROCESSES ACTING ON A TIDAL FLAT,
New Hampshire Univ., Durham. Dept. of Earth Sciences; and New Hampshire Univ., Durham. Jackson Estuarine Lab.
For primary bibliographic entry see Field 02J.
W73-08502

A SANDWAVE FIELD IN THE OUTER THAMES ESTUARY, GREAT BRITAIN,
Unit of Coastal Sedimentation, Taunton (England).
D. N. Langhorne.
Marine Geology, Vol 14, No 2, p 129-143, February 1973. 10 fig, 1 tab, 19 ref.

Descriptors: *Sand waves, *Estuaries, *Surveys, *Sounding, *Sonar, Navigation, Channel morphology, Sediment transport, Dunes, Currents (Water), Mapping.
Identifiers: *Thames Estuary (England).

A method of presentation in which seabed profiles are scale-corrected and replotted in three-dimensional form was developed to aid the study of complex areas of the seabed. For sandwave research the continuity of crests can be studied, and the positional relationship of individual features compared. By plotting successive surveys of the same area, changes can be detected and significant movement measured. In the sandwave field at Long Sand Head, Thames Estuary, the sandwaves can be grouped in morphological zones, depending upon their amplitude, wavelength and cross-sectional asymmetry. Despite marked asymmetry, which suggests opposing directions of movement in different zones, little progressive movement occurs, but rather a 'flexing' of sinuous crestlines results in displacement of up to 25 m in a year. Side-scan sonar surveys emphasize the complexity of the sandwaves within the field and the presence of less table dune bed forms which often lie at considerable angles to the major crests, suggesting a secondary flow regime. (Knapp-USGS)
W73-08504

PLANS FOR REDUCTION OF SHOALING IN BRUNSWICK HARBOR AND JEKYLL CREEK, GEORGIA,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 08B.
W73-08512

EFFECT OF PULPMILL EFFLUENT ON DISSOLVED OXYGEN IN A STRATIFIED ESTUARY -- I. EMPIRICAL OBSERVATIONS,
Fisheries Research Board of Canada, Nanaimo (British Columbia). Biological Station.
For primary bibliographic entry see Field 05C.
W73-08543

EFFECT OF PULPMILL EFFLUENT ON DISSOLVED OXYGEN IN A STRATIFIED ESTUARY - II. NUMERICAL MODEL,
Fisheries Research Board of Canada, Nanaimo (British Columbia). Biological Station.
For primary bibliographic entry see Field 05C.
W73-08544

EFFECTS OF BUNKER C OIL ON INTERTIDAL AND LAGOONAL BIOTA IN CHEDABUCTO BAY, NOVA SCOTIA,
New Brunswick Univ., St. John. Dept. of Biology.
For primary bibliographic entry see Field 05C.
W73-08548

STATEMENT OF FINDINGS--BAL HARBOUR, FLORIDA, PARTIAL BEACH RESTORATION, BEACH EROSION CONTROL AND HURRICANE PROTECTION PROJECT, DADE COUNTY, FLORIDA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Jacksonville, Fla.
For primary bibliographic entry see Field 04A.
W73-08680

GEOCHEMISTRY AND DIAGENESIS OF TIDAL-MARSH SEDIMENT, NORTHEASTERN GULF OF MEXICO,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 02J.
W73-08730

SUSPENDED-SEDIMENT YIELDS OF NEW JERSEY COASTAL PLAIN STREAMS DRAINING INTO THE DELAWARE ESTUARY,
Geological Survey, Trenton, N.J.
For primary bibliographic entry see Field 02J.
W73-08742

SUSPENDED SEDIMENT DATA SUMMARY, AUGUST 1969 - JULY 1970 (MOUTH OF BAY TO HEAD OF BAY),
Johns Hopkins Univ., Baltimore, Md. Chesapeake Bay Inst.
For primary bibliographic entry see Field 07C.
W73-08744

SEDIMENTS IN SURFACE WATERS OF THE EASTERN GULF OF GUINEA,
Woods Hole Oceanographic Institution, Mass.
B. D. Bornhold, J. R. Mascle, and K. Harada.

Available from NTIS, Springfield, Va 22151 as PB-212 488 Price $3.00 printed copy; $1.45 microfiche. Report (Reference No 72-76), September 1972. 28 p, 11 fig, 15 ref. NSF 28193.

Descriptors: *Sediment transport, *Suspended solids, *Gulfs, *Atlantic Ocean, *Africa, Sampling, Boats, Sediment load, Sediment distribution, Ocean currents, Salinity, Correlation analysis.
Identifiers: *Gulf of Guinea (Africa).

Samples of suspended sediment in surface waters were collected off the West coast of Africa throughout the WALDA expedition of the French research vessel, Jean Charcot, in 1971. This report is based on approximately 100 such samples collected in the eastern Gulf of Guinea and is a preliminary attempt to determine the effects that the unique hydrographic conditions of this region have upon the concentration and compostion of suspended sediment. Sediment-laden water is transported to the south of Fernando Poo into the Gulf in a southwesterly direction. The southeasterly flowing Guinea Current along the western edge of the Niger delta and the enormous sediment loads of the distributaries in this area contribute to a major lobe of suspended sediment off the southwestern nose of the delta. Sediment concentration is inversely related to salinity in the northeastern Gulf; the relationship, however, is not linear. Sediment is also swept northward from the continental shelf off Gabon and the Congo Republic into the Gulf. Diatoms are the most abundant organic constituents with lesser amounts of organic aggregates and two varieties of fecal pellets. (Woodard-USGS)
W73-08748

GEOMORPHIC COASTAL VARIABILITY, NORTHWESTERN AUSTRALIA,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
For primary bibliographic entry see Field 02J.
W73-08752

PRELIMINARY RIVER-MOUTH FLOW MODEL,
Louisiana State Univ., Baton Rouge. Dept. of Chemical Engineering.
For primary bibliographic entry see Field 02J.
W73-08753

PERIODICITIES IN INTERFACIAL MIXING,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
L. D. Wright, J. M. Coleman, and J. N. Suhayda.
Available from NTIS, Springfield, Va. 22151, as AD-755 158. Price $3.00 printed copy; $1.45 microfiche. Louisiana State University Coastal Studies Bulletin No 7, p 127-135, Technical Report 133, January 1973. 2 fig, 10 ref. ONR-GP Contract N00014-69-A-0211-0003.

Descriptors: *Mixing, *Saline water-freshwater interfaces, *Mississippi River, Deltas, Density stratification, Diffusion, Dispersion, Sediment transport, Sedimentation, Internal waves.

Efflux from the mouth of South Pass, Mississippi River, expands as a laterally homogeneous layer above the underlying saltwater. Outflow velocity and depth of interface at the mouth tend to maintain a relationship such that the densimetric Froude number has a value near unity. Recent thermal and color infrared imagery indicates that vertical mixing and lateral expansion rates are subject to periodic pulsations at a distance of approximately four channel widths seaward of the mouth. This is indicated by four distinct features within the effluent which are apparent from the imagery: (1) a narrow zone of intense vertical mixing characterized by abrupt temperature change that consistently occurs approximately four channel widths seaward of the mouth; (2) periodic seaward repetition of these zones of temperature contrast; (3) abrupt changes in effluent expansion rates associated with the resultant bands of temperature contrast; and (4) well-defined and closely spaced internal wave crests that occur between and parallel to the more widely spaced thermal bands. (Knapp-USGS)
W73-08756

TOOLS FOR COASTAL ZONE MANAGEMENT.
Marine Technology Society, Washington, D.C. Coastal Zone Marine Management Committee.

Marine Technology Society, Conference Proceedings, February 14-15, 1972, Washington D.C., 216 p, $12.00.

Descriptors: *Coasts, *Planning, *Management, *Water resources development, Future planning, Methodology, Research and development, Institutions.
Identifiers: *Conference proceedings.

Various methods and systems for coastal zone management are presented and discussed. Among the topics covered are environmental baseline studies, matrices and inventories, modeling, and information systems. Current information is reviewed and future possibilities explored. (See W73-08803 thru W73-08815) (Ensign-PAI)
W73-08802

ENVIRONMENTAL GEOLOGIC ATLAS OF THE TEXAS COAST: BASIC DATA FOR COASTAL ZONE MANAGEMENT,
Texas Univ., Austin. Bureau of Economic Geology.
C. G. Groat, and L. F. Brown, Jr.
In: Tools for Coastal Zone Management, Feb. 14-15, 1972, Washington, D.C., p 1-15. 5 fig, 3 tab, 2 ref.

Descriptors: *Geologic mapping, *Texas, *Land use, *Cross-sections, Resources, Physical properties, Biological properties, Terrain analysis, Coasts.
Identifiers: *Environmental geologic atlas, *Multifunctional maps, Land use decisions.

The Bureau of Economic Geology of the University of Texas at Austin has produced an environmental geologic atlas of the Texas coastal zone. Through the use of maps, tables and descriptive text, the atlas attempts to provide the necessary physical data for making informed land-use decisions. The atlas contains seven folios, each of which contain, among other maps, an Environmental Geology Map. The units represented on the geologic maps are defined on the basis of physical or biologic characteristics which are meaningful to engineers, archtiects, and planners, as well as to geologists. Maps detailing physical properties, biologic assemblages, current land uses, mineral resources, water systems and topography are also included. (See also W73-08802) (Ensign-PAI)
W73-08803

THE LARGE VARIABILITY OF WATER QUALITY IN COASTAL WATERS AND SUGGESTIONS FOR HOW WE CAN HANDLE THEM,
Massachusetts Inst. of Tech., Cambridge.
E. Mollo-Christensen.
In: Tools for Coastal Zone Management, Feb 14-15, 1972, Washington, D.C., p 17-26. 8 fig, 1 tab, no ref.

Descriptors: *Coasts, *Pollutants, *Physical properties, *Chemical properties, *Variability, Methods, Mixing, Wind, Water pollution control, Path of pollutants.
Identifiers: *Turbulence, *Wind stress, *Observation systems, *Dispersion.

Examples of the variability of chemical and physical properties of coastal waters are presented. The causes of this variability are briefly discussed and methods for coping with coastal pollution are suggested. Mixing processes generated from the turbulence of tides and currents are the chief natural means of dispersing pollutants in rivers, bays, and estuaries. The sources of turbulence available in coastal waters are more limited in number and weaker in force. The main sources of stirring in ocean water are wind stress on the water surface and wave action caused by wind. The study concludes with a recommendation for a program of data acquisition, data handling and interpretation. It is also suggested that the observation system be coupled closely to the generation of computer models for prediction and assessment. (See also W73-08802) (Ensign-PAI)
W73-08804

MODERN APPROACH TO COASTAL ZONE SURVEY,
Michigan Univ., Ann Arbor. Willow Run Labs.
F. C. Polcyn.
In: Tools for Coastal Zone Management, Feb 14-15, 1972, Washington, D.C., p 41-57. 24 fig, no ref.

Descriptors: *Remote sensing, *Spectrometers, *Mapping, *Currents, Water pollution sources.
Identifiers: *Optical scanner, *Multispectral scanner.

A new type of remote sensing instrument is described. The device involves an optical mechanical scanner which operates with mirrors and not lenses so that the scene in any spectral band between the ultraviolet through the visible and into the thermal infrared region can be observed. This kind of sensing instrument is unique in that it uses a spectrometer at the focal point of the energy collecting mirror. Various application areas for the multispectral scanner are discussed -- including its use in pollution studies. The multispectral scanner system could be used to detect the presence of an oil slick and to identify the different kinds of oil involved. Ice monitoring and mapping of shore currents are two other areas of application for the sensing instrument. (See also W73-08802) (Ensign-PAI)
W73-08805

SOME APPLICATIONS OF PHOTOGRAPHY, THERMAL IMAGERY AND X BAND SIDE LOOKING RADAR TO THE COASTAL ZONE,
Grumman Ecosystems Corp., Bethpage, N.Y.
W. C. Coulbourn.
In: Tools for Coastal Zone Management, Feb 14-15, 1972, Washington, D.C., p 59-65.

Descriptors: *Remote sensing, *Aerial photography, *Outfall sewers, *Pollutant identification, Wetlands, Water sampling, Temperature.
Identifiers: *Daedalus Thermal Line Scanner, *Surface photography, Ice monitoring, Water surface patterns.

Results of several water study projects are reported. One study was undertaken to evaluate aerial remote sensing as an effective technique in detecting outfalls into navigable waterways of the New York District. Night and daylight flights were conducted in the study area; a Daedalus Thermal Line Scanner was used to provide thermal imagery in 2 bands. Surface photography was taken from boats, along with surface water sampling and temperature readings. Remote sensing was shown to be useful in detecting outfalls -- 131 outfalls were discovered, 124 of which were clearly visible on the color, and 71 visible on the thermal imagery. Another project was to determine the most efficient scale and photographic film emulsion for use in identifying wetlands vegetation in Maryland. The thermal line scanner proved useful in delineating the waterland or water-vegetation boundary line, but was not used in the identification of wetland vegetation. Remote sensing was also shown

to be helpful in detecting icebergs and ocean surface roughness patterns. (See also W73-08802) (Ensing-PAI)
W73-08806

THE NATIONAL OCEAN SURVEY COASTAL BOUNDARY MAPPING,
National Ocean Survey, Rockville, Md. Coastal Mapping Div.
J. E. Guth.
In: Tools for Coastal Zone Management, Feb 14-15, 1972, Washington, D.C. p 67-69.

Descriptors: *Coasts, *Management, *Boundaries, *Mapping, *Water levels, Remote sensing, State governments, Federal governments.
Identifiers: *National Ocean Survey.

Coastal boundary mapping is an essential prerequisite for coastal zone management. A system for boundary mapping is outlined. Mean low water and high water lines are mapped and used as base lines from which boundary determinations can be made. A twostage system for mapping the wetlands is described whereby remote sensing technique are supplemented with accurate ground truth surveys. It is suggested that the problem of total coastal boundary mapping ought to be handled on the state and federal level, rather than by private sectors. (See also W73-08802) (Ensign-PAI)
W73-08807

METHODS FOR ENVIRONMENTAL PLANNING OF THE CALIFORNIA COASTLINE,
California Univ., Berkeley. Dept. of Landscape Architecture.
R. H. Twiss, and J. C. Sorensen.
In: Tools for Coastal Zone Management, Feb 14-15, 1972, Washington, D.C., P +±*:. + FIG, : REF.

Descriptors: *Coasts, *Planning, *Tourism, *Recreation, *Land use, *Project feasibility, Environmental effects, *California.
Identifiers: Impact identification, Project characteristics.

The Coastal zone planning effort in California is reviewed. Increasing demand for tourist and recreational development of coastal land and all the related problems of this sort of development have made the emphasis in coastal zone planning one of land use rather than coastal water concern. This study outlines a procedure that would allow a local agency to systematically relate the actions of a proposed project to probable changes in environmental conditions. Topics discussed include impact identification, environmental capability, and project characteristics. (See also W73-08802) (Ensign-PAI)
W73-08808

THE CHESAPEAKE BAY INVENTORY SYSTEM,
Johns Hopkins Univ., Baltimore, Md. Dept. of Radiology.
R. F. Beers, Jr.
In: Tools for Coastal Zone Management, Feb 14-15, 1972, Washington, D.C., p 85-93. 1 ref.

Descriptors: *Chesapeake Bay, *Planning, *Management, *Model studies, Data storage and retrieval.
Identifiers: *Interaction model, *Man-environment interface, *Inventory system, Impact studies.

The Chesapeake Bay inventory system is a method for dealing with the planning and management problems of the Bay region. The study's focal point is the interaction between man and his environment. The inventory system is modeled from the Leontief economic input-output model of interacting entities. The interaction model includes biological, physical-geographical, physical-meteorological, physical-hydrological, oceanographical, governmental and societal entities. This system facilitates the assessment of short and long term, direct and indirect consequences of a particular management decision. It can also assist in the identification and description of specific processes which may be controlled or replaced in order to minimize the magnitude of the impact of an interactive event. Lastly, the inventory system delineates areas of ignorance about data essential for the decision maker. (See also W73-08802) (Ensign-PAI)
W73-08809

COASTAL ZONE MANAGEMENT SYSTEM: A COMBINATION OF TOOLS,
Center for the Environment and Man, Inc., Hartford, Conn.
R. H. Ellis.
In: Tools for Coastal Zone Management, Feb 14-15, 1972, Washington, D.C., p 95-111. 6 fig, 1 ref.

Descriptors: *Data storage and retrieval, *Coasts, *Planning, Management, Systems analysis, Synthetis, Analysis, Design.
Identifiers: *MIS, *Long Island.

System techniques for organizing, synthesizing, analyzing and applying information for coastal zone management are discussed. A management information system (MIS) used in Long Island to aid in planning and management of marine coastal resources is described. The components of MIS include: data storage and retrieval, environmental relationships, analytical design, synthesis and analysis and executive control. The importance of information collection, storage, and retrieval is stressed. Ways of combining analytical approaches and models into one management information framework are explored. (See also W73-08802) (Ensign-PAI)
W73-08810

THE MARINE ENVIRONMENT AND RESOURCES RESEARCH AND MANAGEMENT SYSTEM MERRMS,
Virginia Inst. of Marine Science, Glouster Point.
J. B. Pleasants.
In: Tools for Coastal Zone Management, Feb 14-15, 1972, Washington, D.C., p 113-119.

Descriptors: *Data transmission, *Information exchange, *Environment, Resources, *Research and development, *Management, Wetlands, Shores, *Data storage and retrieval, Libraries, Chesapeake Bay.
Identifiers: MERRMS.

Various facets of the Marine Environment and Resources Research and Management System (MERRMS) of the Virginia Institute of Marine Science are described. MERRMS was designed to make relevant data, properly organized and presented, available to advisors, managers and researchers. Sectors covered within the system include: a wetlands, shallows and shorelines inventory, Chesapeake Bay bibliography, data banks, library, and visual displays. MERRMS is presently in the final stages of initial development. (See also W73-08802) (Ensign-PAI)
W73-08811

MARINE TECHNOLOGY TRANSFER DEPENDS UPON INFORMATION TRANSFER,
Environmental Protection Agency, Washington, D.C. Div. of Water Quality Standards.
R. F. Powell.
In: Tools for Coastal Zone Management, Feb 14-15, 1972, Washington, D.C., p 121-143. 3 fig, 1 tab, no ref.

Descriptors: Technology, *Technical writing, *Planning, *Management, *Data transmission, *Information exchange.
Identifiers: TIMP, Coastal zone management.

The Technical Information and Management Planning System (TIMP) of the EPA is discussed as a method of making existing marine technology easily accessible to all. The system has a number of unique characteristics. It recognizes that no technology transfer takes place without a preceding selective, efficiently obtained transfer of information. It can function as a system servicing a system and it offers a means of recognizing specific 'needs statements.' Also the TIMP system functions on standard English language, so no abstractors or interpreters are necessary. It is maintained that with some broadening of data bases and possible system modifications, the TIMP system is highly desirable for the achievement of effective coastal zone management. (See also W73-08802) (Ensign-PAI)
W73-08812

EVALUATION OF COASTAL ZONE MANAGEMENT PLANS THROUGH MODEL TECHNIQUES,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
R. W. Whalin, and F. A. Herrmann, Jr.
In: Tools for Coastal Zone Management, Feb 14-15, 1972, Washington, D.C., p 149-176. 23 fig.

Descriptors: *Hydraulic models, *Beaches, *Harbors, *Estuaries, *Design, *Management, *Construction, *Planning, Artificial beaches, Shoals, Evaluation.
Identifiers: Hydraulic regimes, Salinity regimes, Shoaling regimes.

Results of several hydraulic model studies are presented. Projects reviewed include studies conducted on estuarine design, estuarine management, beach development, harbor construction and development, and investigations of artificial islands and reefs. Scale models are demonstrated to be useful in evaluating the effects of specific projects on the hydraulic, salinity, and shoaling regimes in estuaries. Modeling is also effective for overall management of coastal zone. (See also W73-08802) (Ensign-PAI)
W73-08813

HYDRAULIC MODELING OF AN ENVIRONMENTAL IMPACT: THE JAMES ESTUARY CASE,
Virginia Inst. of Marine Science, Gloucester Point.
M. M. Nichols.
In: Tools for Coastal Zone Management, Feb 14-15, 1972, Washington, D.C., p 177-184. 4 fig, 8 ref.

Descriptors: *Hydraulic models, *Estuaries, *Channel improvement, *Dredging, *Streambeds, *Oysters, *Productivity, Environmental effects, *Virginia.
Identifiers: *James River Estuary, Flow regime, Salinity regime.

A hydraulic model study was used to predict the effects of channel deepening on oyster production in the James River estuary, Virginia. The model study showed how sensitive the salinity and flow regime of an estuary is to small changes in bottom geometry. The long-term cumulative effects of channel-deepening could be grave. The study also pointed up the need for greater accuracy in verification and testing so that the transient conditions characteristic of natural estuaries can be accomodated. (See also W73-08802) (Ensign-PAI)
W73-08814

PREDICTIVE MODELS OF SALINITY AND WATER QUALITY PARAMETERS IN ESTUARIES,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
D. R. F. Harleman, M. L. Thatcher, and J. E. Dailey.
In: Tools for Coastal Zone Management, Feb 14-15, 1972, Washington, D.C., p 185-195. 6 fig, 4 ref.

Descriptors: *Estuaries, *Water quality, *Management, *Model studies, *Forecasting, *Mathematical studies, Salinity, Temperature, Dissolved oxygen, Path of pollutants.
Identifiers: Mass transportation, Continuity, Longitudinal momentum equations.

Techniques of mathematical modeling for water quality control and management in mixed estuaries are discussed. A water quality model can be used to study the time-dependent, longitudinal distribution of salinity, temperature, dissolved oxygen or other water quality parameters. The discussion centers on one-dimensional water quality models which utilize and predict information that is related to available or accessible field data. Mass transportation, continuity, and longitudinal momentum equations are presented. Mathematical modeling permits the use of either synoptic or intermittent field data; through its use more attention can be given to the generation, decay and interaction of multiple water quality indicators under estuarine conditions. (See also W73-08802) (Ensign-PAI)
W73-08815

THE COLUMBIA RIVER ESTUARY AND ADJACENT OCEAN WATERS, BIOENVIRONMENTAL STUDIES.

Edited by A.T. Pruter and D. L. Alverson, University of Washington Press, Seattle, Wash., 1972. 876 p. $22.00.

Descriptors: *Columbia River, *Coasts, *Estuaries, *Radioisotopes, Biota, Ecosystems, Environmental effects, Estuarine environment, Physicochemical properties, *Washington, *Oregon, *Pacific Ocean.

The physical, chemical, and biological aspects of the Columbia River estuary and adjacent ocean waters are thoroughly discussed. Special attention is given to the levels and fate of radionuclides in these waters. The material presented represents extensive investigations carried out by Oregon State University, University of Washington, Battelle Memorial Institute, and the National Marine Fisheries Service. It is organized into sections on background and history of the projects, Columbia River-Pacific Ocean relationships, composition and distribution of the biota of the marine environment and radionuclides in the ecosystem. (See W73-08817 thru W73-08849) (Ensign-PAI)
W73-08816

THE HISTORY OF HANFORD AND ITS CONTRIBUTION OF RADIONUCLIDES TO THE COLUMBIA RIVER,
Battelle Memorial Inst., Richland, Wash. Pacific Northwest Labs.
R. F. Foster.
In: The Columbia River Estuary and Adjacent Ocean Waters, University of Washington Press, Seattle, Wash., p 3-18, 1972. 7 fig, 16 ref.

Descriptors: *Columbia River, *Nuclear reactors, *Cooling water, Nuclear wastes, Water pollution sources, Environmental effects, Washington.
Identifiers: Historical survey, Laboratory research, Field research, *Hanford (Wash).

From 1943 to 1945 plutonium-producing reactors were established in Hanford, Washington. Studies of the effects of coaling waters discharged from the plants into the Columbia River were initiated even before the reactors began operations. By the late 1950's scientific and public interest in radioactive wastes and environmental effects had increased significantly enough to support much broader based research in the Columbia River and its estuaries. A short history of these early efforts to monitor the environment is presented. (See also W73-08816) (Ensign-PAI)
W73-08817

PHYSICAL ASPECTS OF THE COLUMBIA RIVER AND ITS ESTUARY,
Oregon State Univ., Corvallis. Dept. of Oceanography.
V. T. Neal.
In: The Columbia River Estuary and Adjacent Ocean Waters, University of Washington Press, Seattle, Wash., p 19-40, 1972. 21 fig, 3 tab, 10 ref. ONR Project NR083-102.

Descriptors: *Columbia River, *Physical properties, *Estuaries, Climatic data, River flow, Tides, Seawater intrusion, Water pollution, Methodology.
Identifiers: Water contaminants, *Flushing, Tidal-prism method, Fraction-of-freshwater method.

Various physical aspects of the Columbia River and its adjacent waters are described. Brief discussions of river flow, navigation, geomorphology, climatic conditions, tides and seawater intrusion are presented. Flushing and pollution distribution in the river estuary (defined as that area of the river subject to salinity intrusion) are examined in greater detail. Some methods used to predict the flushing of contaminants from an estuary are outlined. These include: the classical tidal-prism method, modified tidal-prism method, fraction-of-freshwater method and exponential-decrease method. (See also W73-08816) (Ensign-PAI)
W73-08818

CIRCULATION AND SELECTED PROPERTIES OF THE COLUMBIA RIVER EFFLUENT AT SEA,
Washington Univ., Seattle. Dept. of Oceanography.
C. A. Barnes, A. C. Duxbury, and B. A. Morse.
In: The Columbia River Estuary and Adjacent Ocean Waters, University of Washington Press, Seattle, Wash., p 41-80, 1972. 23 fig, 2 tab, 39 ref. AEC AT (45-1)-1725 and ONR Nonr-477 (37).

Descriptors: *Columbia River, *Climatic data, *Effluents, *Currents, Sediment, Pacific Ocean, Mixing, *Ocean circulation, Seasonal, Path of pollutants.
Identifiers: *Freshwater plume, Ekman transport.

The Columbia River discharges an average of 7300 m3/sec of freshwater into the Pacific Ocean. The areal extent and location of this freshwater plume are the result of seasonal differences in climate. The major seasonal differences in the distribution of river water and the surface and bottom currents of the coastal region are discussed. Two prominent seasonal patterns of effluent distribution prevail; one lies north of the river mouth and inshore during the southerly winds of winter, the other lies south and offshore during the northerly summer winds. Surface currents and inshore bottom currents evidence short-term variability within seasonal trends because they respond rapidly to changes in wind speed and direction. Data gathered on distribution of water properties, movement of seabed drifters, sediment transport, direct current measurements and radionuclide tracer studies are reviewed. The study concludes that there is a consistent pattern of seasonal trend and short-period variability in the distribution and dispersion of the Columbia River water and its dissolved and suspended load. (See also W73-08816) (Ensign-PAI)
W73-08819

REVIEW OF COMMERCIAL FISHERIES IN THE COLUMBIA RIVER AND IN CONTIGUOUS OCEAN WATERS,
National Marine Fisheries Service, Seattle, Wash. Exploratory Fishing and Gear Research Base.
A. T. Pruter.
In: The Columbia River Estuary and Adjacent Ocean Waters, University of Washington Press, Seattle, Wash., p 81-120, 1972. 19 fig, 16 tab, 17 ref.

Descriptors: *Columbia River, *Pacific Ocean, *Fisheries, Fish types, Planning, Fish harvest, Fishing gear, Domestic waters, Foreign waters.
Identifiers: Freshwater (anadromous and marine species).

The important commercial fisheries in the Columbia River and ocean areas are categorized into three units, freshwater, anadromous and marine species, and analyzed in terms of long-range planning and resource development. Representative members of each category of fish are examined with attention to size of harvest, fishing area and types of harvesting gear used. Domestic and foreign ocean fisheries are discussed separately. Some of the fish types studied include the following: freshwater fish -- crawfish and carp; anadromous fish -- salmon, steelhead trout, American shad and sturgeon; and marine species -- Pacific saury, flounders, and northern anchovy. (See also W73-08816) (Ensign-PAI)
W73-08820

CHEMICAL BUDGET OF THE COLUMBIA RIVER,
Oregon State Univ., Corvallis. Dept. of Oceanography.
P. K. Park, C. L. Osterberg, and W. O. Forster.
In: The Columbia River Estuary and Adjacent Ocean Waters, University of Washington, Press, Seattle, Wash., p 123-134, 1972. 6 fig, 4 tab, 13 ref. ONR Nonr 1286 (10) and AEC AT (45-1)-1750; NSF GP-2976 and GP-5317.

Descriptors: *Columbia River, *Estuaries, *Alkalinity, *Salinity, Stream flow, *Phosphates, Water quality, Plankton, Nutrients, *Chemical properties.

Data collected on the chemical features of the Columbia River estuary -- such as alkalinity, pH, dissolved oxygen, phosphate, salinity, nitrate etc. can be used along with stream flow rate to calculate the monthly and annual budgets of the chemicals. Knowing the monthly chemical condition of the estuary is important since it serves as an index of water quality and nutrient condition which is in turn linked to the river's ultimate plankton productivity and distribution. The various economically important estuary organisms depend on a balanced nutrient-plankton relation. Average chemical composition of the river water is 0.5 micro M phosphate, 12 micro M nitrate, 160 micro M silicate, 1.0 meq/liter alkalinity, 1.0 mM carbon dioxide, and 7.4 ml/liter oxygen; average pH is 7.7. (See also W73-08816) (Ensign-PAI)
W73-08821

RIVER-OCEAN NUTRIENT RELATIONS IN SUMMER,
Geological Survey, Menlo Park, Calif. Water Resources Div.
T. J. Conomos, M. G. Gross, C. A. Barnes, and F. A. Richards.
In: The Columbia River Estuary and Adjacent Ocean Waters, University of Washington Press, Seattle, Wash., p 151-175, 1972. 16 fig, 4 tab, 38 ref. AEC AT (45-1)-1725.

Descriptors: *Columbia River, *Pacific Ocean, *Mixing, Upwelling, *Nitrates, *Phosphates, Silicates, Data collections, Sampling, *Seasonal, Nutrients.
Identifiers: Two-stage mixing, Vertical temperature variation.

Mixing processes of Columbia River water and Pacific Ocean water (near the river mouth) were investigated to gain a better understanding of the interaction between rivers and the ocean. Mixing is a two-stage process, controlled primarily by river discharge and tidal action. The first stage occurs in the estuary and involves interaction between freshwater from the river and subsurface ocean water flowing into the estuary above the bottom. River water in the first stage supplies virtually all the silicate and a little phosphate, while the ocean water carries nearly all the nitrate and most of the phosphate. In the second stage of mixing (occurring just seaward of the river mouth) seaward-moving low-salinity water induces upwelling and entrainment of the deeper subsurface ocean water. The study examined mixing processes by assessing data on vertical variations of temperature, salinity, and nutrient concentrations; the data helped distinguish different water parcels and qualitatively determine their movement in the coastal ocean. (See also W73-08816) (Ensign-PAI)
W73-08823

RIVER-OCEAN SUSPENDED PARTICULATE MATTER RELATIONS IN SUMMER,
Geological Survey, Menlo Park, Calif. Water Resources Div.
T. J. Conomos, and M. G. Gross.
In: The Columbia River Estuary and Adjacent Ocean Waters, University of Washington Press, Seattle, Wash., p 176-202, 1972. 17 fig, 4 tab, 36 ref. AEC AT (45-1)-1725.

Descriptors: *Columbia River, *Suspended solids, *Phytoplankton, Particle shape, Particle size, Specific gravity, Currents, Coasts, Seasonal.
Identifiers: Resuspended particles, Particulate pathways, Lithogenous particles, Biogenous particles.

Various processes interact to govern the distribution and dispersal of suspended particulate matter in the Columbia River and coastal ocean. Summer studies conducted on the river and coastal waters indicate that the major sources of suspended particles are the river, phytoplankton growing in the ocean near the river, and particles resuspended from the bottom. The paths followed by suspended sediments depend on such variables as particle morphology, specific gravity, composition and elasped time after discharge from the river mouth. 85 to 95% of particulate matter in the Columbia River consists of lithogenous particles; the bulk of matter found in the ocean is biogenous particles, mainly phytoplankton and detritus. Strong tidal and hydraulic currents near the river mouth serve to resuspend sediment in near-bottom waters. Suspended-particle concentrations are nonconservative properties of seawater; settling of particles is the primary process decreasing particle concentrations. (See also W73-08816) (Ensign-PAI)
W73-08824

EFFECTS OF COLUMBIA RIVER DISCHARGE ON CHLOROPHYLL A AND LIGHT ATTENUATION IN THE SEA,
Oregon State Univ., Corvallis. Dept. of Oceanography.
L. F. Small, and H. Curl, Jr.
In: The Columbia River Estuary and Adjacent Ocean Waters, University of Washington Press, Seattle, Wash., p 203-218, 1972. 5 fig, 3 tab, 18 ref. AEC AT (45-1)-1741 and AT (45-1)-1750.

Descriptors: *Columbia River, *Discharge, *Chlorophyll, *Light penetration, *Nutrient removal, Upwelling, Runoff.
Identifiers: Chlorophyll a, Light extinction, Riley equation.

The effects of Columbia River discharge on chlorophyll a concentration and light attenuation in the sea off Oregon were studied. Although the River acts as a point source for particles and nutrients, its effect on light extinction and chlorophyll a concentration is manifest only out to approximately 45 miles during all seasons. The major factor controlling chlorophyll concentration is thought to be nutrient depletion, which increase with distance from the mouth of the Columbia. Upwelling in summer and coastal runoff in winter generally keep chlorophyll concentrations high inshore in areas away from the river mouth. No seasonal differences within any hydrographic regime could be established for light attentuation. The Riley equation was used to predict mean chlorophyll a and mean light-extinction values. The data was examined in relation to effects of upwellings, coastal runoff other than that from the Columbia River, and oceanic water. (See also W73-08816) (Ensign-PAI)
W73-08825

ASPECTS OF MARINE PHYTOPLANKTON STUDIES NEAR THE COLUMBIA RIVER, WITH SPECIAL REFERENCE TO A SUBSURFACE CHLOROPHYLL MAXIMUM,
Washington Univ., Seattle. Dept. of Oceanography.
G. C. Anderson.
In: The Columbia River Estuary and Adjacent Ocean Waters, University of Washington Press, Seattle, Wash., p 219-240, 1972. 8 fig, 43 ref. AEC AT (45-1)-1725 and ONR Nonr-477 (37).

Descriptors: Washington, Oregon, Coasts, *Phytoplankton, *Primary productivity, Data collections, *Chlorophyll, Nutrients, Theoretical analysis, Columbia River, Seasonal, Pacific Ocean.
Identifiers: Vertical distribution.

Phytoplankton and primary production processes in waters off the Washington and Oregon coasts have been studied since 1961. Findings are reviewed. Areas examined include: size fractionation of phytoplankton populations in different areas and seasons; adaptations of populations to changes in light; excretion of dissolved organic matter by phytoplankton; seasonal and vertical distribution of particulate matter in deep seawater; and the seasonal and areal distributions of phytoplankton concentrations and primary production rates. Data from recent studies on the mechanisms which regulate the supply of nutrients to surface waters and information on the processes responsible for forming chlorophyll concentrations at depth are also reported. The average information synthesized from all prior and on-going studies will be used to define the pathways of radionuclide into the biota. Another equally important use of collected data is in constructing a theoretical quantitative model for phytoplankton production. (See also W73-08816) (Ensign-PAI)
W73-08826

BOTTOM TOPOGRAPHY AND SEDIMENT TEXTURE NEAR THE COLUMBIA RIVER MOUTH,
Washington Univ., Seattle. Dept. of Oceanography.
D. A. McManus.
In: The Columbia River Estuary and Adjacent Ocean Waters, University of Washington Press, Seattle, Wash., p 241-253, 1972. 11 fig, 2 tab, 8 ref. AEC AT (45-1)-1725.

Descriptors: *Columbia River, *Continental shelf, *Sediments, *Topography, Sedimentology, Sampling, Sands.
Identifiers: Sediment textures, Topographical units, Sedimentological units.

The continental shelf area near the Columbia River mouth can be divided into several topographical-sedimentological units, on the basis of descriptions of topography and sediment texture. This study proposes the following units of division: (1) rough topography of relict sediments, (2) outer-shelf silty sand, (3) inner-shelf sand wedge, (4) nearshore sand, (5) Columbia River silt deposit, and (6) shelf-break sand. The first unit occurs mainly in thesouthwest part of the shelf area. The second unit is located on the landward margin of the first unit, both to the north and south of Astoria Canyon. The third unit extends south of the Columbia River and offshore to approximately 73 m water depth, while the fourth unit extends north of the river and out to about 55 m. The fifth unit trends northwesterly along the outer shelf from the mouth of the Columbia and the sixth unit is located at the shelf-break. Sediment textures found in each of these divisions are described in some detail. (See also W73-08816) (Ensign-PAI)
W73-08827

DISTRIBUTION OF ORGANIC CARBON IN SURFACE SEDIMENT, NORTHEAST PACIFIC OCEAN,
Washington Univ., Seattle. Dept. of Oceanography.
M. G. Gross, A. G. Carey, Jr., G. A. Fowler, and L. D. Kulm.
In: The Columbia River Estuary and Adjacent Ocean Waters, University of Washington Press, Seattle, Wash., p 254-264, 1972. 4 fig, 2 tab, 27 ref. ONR NR 083 012. ONR Nonr 1286 (10).

Descriptors: *Pacific Ocean, *Continental shelf, Organic compounds, *Carbon, Sediments, *Sediment transport.
Identifiers: *Organic carbon.

Organic carbon in surface sediment is unevenly distributed in the northeast Pacific Ocean. Observation of carbon-rich and carbon-poor sediments reveals a zoned distribution which roughly parallels the coast. This distribution is believed to be caused by the interaction of several processes, the most important of which seems to be transport of sediment-associated organic matter. Surface and near-bottom currents tend to move particles along the continental shelf rather than across it. The submarine ridge system and seachannels on the ocean floor are both more or less parallel to the coast, which apparently helps restrict the seaward movements of organic carbon in sediments. Relative rates of sediment accumulation and destruction of organic matter are also important. (See also W73-08816) (Ensign-PAI)
W73-08828

THE DISTRIBUTION OF MICROBIOGENIC SEDIMENT NEAR THE MOUTH OF THE COLUMBIA RIVER,
Shoreline Community Coll., Seattle, Wash. Div. of Science.
R. A. Harmon.
In: The Columbia River Estuary and Adjacent Ocean Waters, University of Washington Press, Seattle, Wash., p 265-278, 1972. 4 fig, 14 ref. AEC AT (45-1)-1725.

Descriptors: *Columbia River, *Continental shelf, *Bottom sediments, *Microorganisms, Currents, Hypolimnion.
Identifiers: Biozones, Indigenous organisms, Sediments (Microbiogenic).

The distribution and concentration of microbiogenic hard parts within the bottom sediment on the continental shelf near the Columbia River mouth are described. Based on the microbiogenic components in the sediment, three biozones were established. Boundaries of these zones seemed to be influenced by several factors, including water depth and position relative to shore or the shelf break, nature of coastal substrate or degree of sedimentation, and prevailing currents. In areas of low sediment accumulation, the distribution of biogenic particles reflects either indigenous organisms or possibly, reworked or re-

lict biogenic sediment. It is implied that the distribution of microbiogenic organisms and their living-to-dead ratios in sediments are of potential use for inferring themovement of bottom waters. (See also W73-08816) (Ensign-PAI)
W73-08829

STUDIES OF THE AEROBIC, NONEXACTING, HETEROTROPHIC BACTERIA OF THE BENTHOS,
Georgia Univ., Athens. Dept. of Microbiology.
W. J. Wiebe, and J. Liston.
In: The Columbia River Estuary and Adjacent Ocean Waters, University of Washington Press, Seattle, Wash., p 281-312, 1972. 1 fig, 23 tab, 45 ref. NSF G-19434.

Descriptors: Oregon, Washington, Coasts, *Aerobic bacteria, *Sampling, Continental shelf, *Continental slope, Pseudomonas bacteria, Pacific Ocean.
Identifiers: *Heterotrophic bacteria (Nonexacting), Bacteria counts, Surface sediments, Depth-dependency.

Information on the aerobic, nonexacting heterotrophic bacteria in the surface sediments of the seabed off the Oregon and Washington coasts is presented. Marine sediment samples were obtained with a gravity geological corer. Sampling for aerobic heterotrophic bacteria was performed as soon as possible and never more than a few hours after the sample was first drawn. No statistical difference was found between continental shelf and slope samples; viable counts in the samples averaged 2.0 x 10000 bacteria/ml mud-water slurry. Study results indicate that the bacteria are evenly distributed over the entire region. The results also imply that there are physical and biological pressures which limit bacteria numbers in sediments. Of 366 strains of bacteria examined, gram-negative rods, mainly Pseudomonas types, were predominant. Distribution patterns of most genera and Pseudomonas groups were depth dependent. Biochemical capabilities of isolates at each sampling station were similar. (See also W73-08816) (Ensign-PAI)
W73-08830

DISTRIBUTION OF PELAGIC COPEPODA OFF THE COASTS OF WASHINGTON AND OREGON DURING 1961 AND 1962,
Washington Univ., Seattle. Dept. of Oceanography.
W. K. Peterson.
In: The Columbia River Estuary and Adjacent Ocean Waters, University of Washington Press, Seattle, Wash., p 313-343. 1972. 14 fig, 5 tab, 37 ref. ONR Project NR 083 012. AEC AT (45-1)-1725 and ONR Nonr-477 (37).

Descriptors: Washington, Oregon, Coasts, *Zooplankton, *Sampling, *Copepods, Continental shelf, Continental slope, Seasonal, *Pacific Ocean.
Identifiers: *Plume and ambient water zone.

Zooplankton samples were taken in the upper 200 m off the coasts of Washington and Oregon in order to provide information on the seasonal and geographic distribution of copepods in this area. To gain a better understanding of the distribution of zooplankton, the area sampled was divided into two separate sets of regimes: plume and ambient and shelf, slope, and oceanic zones. Data collected indicate that in summer zooplankton volumes and total number of copepods are greater in ambient than in plume regions and greater in oceanic than in shelf areas. In winter this situation was reversed for total copepods, and shelf water contained more than oceanic water. Possible reasons for these variations are discussed. The study concludes that the Columbia River plume affects the biology of the area studied. Effects on zooplankton are quite large-scale and should probably be considered a general feature of the area, in the same manner that nearshore upwelling is taken as a general feature of the shelf regime in summer. Furthermore, the Columbia River plume can be considered as an extension of an environment similar to inshore water. (See also W73-08816) (Ensign-PAI)
W73-08831

EFFECTS OF THE COLUMBIA RIVER PLUME ON TWO COPEPOD SPECIES,
Oregon State Univ., Corvallis. Dept. of Oceanography.
L. F. Small, and F. A. Cross.
In: The Columbia River Estuary and Adjacent Ocean Waters, University of Washington Press, Seattle, Wash., p 344-350. 1972. 1 fig, 9 ref. AEC AT (45-1)-1751.

Descriptors: *Columbia River, *Discharge, *Copepods, *Sampling, Salinity, Temperature, Water pollution, Environmental effects, Seasonal.
Identifiers: Acartia danae, Centropages mcmurrichi, *Plumes.

Two copepod species, Acartia danae and Centropages mcmurrichi, were examined in order to assess the effect of Columbia River discharge on copepod distribution. The collecting area began at the river mouth, extended south to the Oregon-California border and from the Oregon coast west to 165 nautical miles offshore. Surface net tows were made at each of several sampling stations using modified Clarke-Bumpus quantitative samplers equipped with mesh nets. Temperature and salinity determinations were made concurrently with each copepod collection. The study concludes that Acartia danae is a good indicator of the western and southern limits of Columbia River plume waters. Because A. danae was not found in upwelled coastal waters, no differentiation could be made during the summer between the inshore edge of the plume and upwelled water. Centropages mcmurrichi showed no distributional relation to plume waters. (See also W73-08816) (Ensign-PAI)
W73-08832

DISTRIBUTION AND ECOLOGY OF OCEANIC ANIMALS OFF OREGON,
Oregon State Univ., Corvallis. Dept. of Oceanography.
W. G. Pearcy.
In: The Columbia River Estuary and Adjacent Ocean Waters, University of Washington Press, Seattle, Wash., p 351-377. 1972. 3 fig, 10 tab, 65 ref. AEC AT (45-1)-1750 and NSF GB-5494 and GB-1588.

Descriptors: Oregon, Coasts, *Pacific Ocean, *Aquatic animals, Data collections, Vertical migration, Nekton, Depth, Seasonal.
Identifiers: *Pelagic animals.

Knowledge currently available on nektonic organisms occurring off Oregon is summarized. Pelagic animals identified from collections or observations carried out nearshore and as far as 165 nautical miles off the Oregon coast are listed according to phylum, class and order. The fauna is mainly associated with subarctic and transitional water. The species of animals which dominated the catches (made from 1961 to 1968) remained fairly constant; the abundance of individual species, however, were seasonally variable. Variations in abundance were frequently correlated with seasonal changes in prevailing currents and upwelling. Certain trends discerned from difference in night and day catches strongly suggest diel vertical migrations of small nektonic animals off Oregon. The need for future research on abundance patterns and distribution of pelagic species, depths ranges for animals which migrate vertically, and energy flow, is stressed. (See also W73-08816) (Ensign-PAI)
W73-08833

TECHNIQUES AND EQUIPMENT FOR SAMPLING BENTHIC ORGANISMS,
Oregon State Univ., Corvallis. Dept. of Oceanography.
A. G. Carey, Jr., and H. Heyamoto.
In: The Columbia River Estuary and Adjacent Ocean Waters, University of Washington Press, Seattle, Wash., p 378-408. 1972. 16 fig, 3 tab, 32 ref. AEC AT (45-1)1750 and AT (45-1)1758.

Descriptors: *Sampling, *Reliability, *On-site data collections, *Testing procedures, Quality control.
Identifiers: Biological sampling, Anchor-box dredges, Otter trawls, Corers, Screening devices, Smith-McIntyre grab.

Biological sampling poses certain problems to the investigator, and there is little agreement among scientists on optimum methods for sampling. Most benthic samples are difficult to quantify because each sampling device operates differently in different substrates. Various forms of sampling gear and field methods used by Oregon State University and the U.S. Bureau of Commercial Fisheries are described and discussed. Some of the equipment described include an anchor-box dredge, otter trawls, corers, screening devices and a Smith-McIntyre grab. Each type of sampling device is described and the procedures used to employ the equipment in field situations are discussed. Techniques used to recover, identify, and weigh the catches are outlined; some innovations designed to adapt existing gear to differing conditions are also presented. (See also W73-08816) (Ensign-PAI)
W73-08834

A PRELIMINARY CHECKLIST OF SELECTED GROUPS OF INVERTEBRATES FROM OTTER--TRAWL AND DREDGE COLLECTIONS OFF OREGON,
Oregon State Univ., Corvallis. Dept. of Oceanography.
J. W. McCauley.
In: The Columbia River Estuary and Adjacent Ocean Waters, University of Washington Press, Seattle, Wash., p 409-421. 1972. 1 tab, 20 ref.

Descriptors: *Data collections, Oregon, Coasts, *Aquatic animals, Invertebrates, Distribution pattern, Pacific Ocean.
Identifiers: *Epifaunal species.

A preliminary checklist for epifaunal species of nine phyla occurring off the coast of Oregon is presented. The list was compiled from data collected during some 246 otter-trawl collections and 50 biological-dredge collections. The checklist also provides observed depth ranges from shallowest to deepest occurrence for species within each phylum. (See also W73-08816) (Ensign-PAI)
W73-08835

ECOLOGICAL OBSERVATIONS ON THE BENTHIC INVERTEBRATES FROM THE CENTRAL OREGON CONTINENTAL SHELF,
Oregon State Univ., Corvallis. Dept. of Oceanography.
A. G. Carey, Jr.
In: The Columbia River Estuary and Adjacent Ocean Waters, University of Washington Press, Seattle, Wash., p 422-443. 1972. 8 fig, 5 tab, 24 ref. AEC AT (45-1)-1750 and AT (45-1)-1758.

Descriptors: Oregon, *Pacific Ocean, *Benthic fauna, Sampling, Continental shelf, Biomass, Distribution patterns, Water temperature, Salinity, Oxygen, Sediments, Organic matter.
Identifiers: *Infaunal distribution, *Arthropods, *Polychaetes, Sediment texture.

A short review of some aspects of the ecology of central Oregon shelf benthic invertebrate found is offered. Infaunal samples were obtained through the use of either a Sanders deep-sea anchor dredge

or an anchor-box dredge. Composition of the benthic fauna changes with increasing depth and distance from shore. Macroepibenthos, for instance, changes from a sparse molluscan assemblage to one dominated by numerous echinoderms and arthoropods. Infauna demonstrate a seaward trend in composition: arthropods dominate inshore, polychaetes offshore. Abundance increases seaward, the largest numerical density and biomass occurring at the outer edge of the continental shelf. Water temperature, salinity, and oxygen content all play a part in the abundance and composition of the fauna. The texture and organic content of the shelf sediment is suggested as a major determinant of faunal abundance and composition, but is only one of several interacting factors. (See also W73-08816) (Ensign-PAI)
W73-08836

DISTRIBUTION AND RELATIVE ABUNDANCE OF INVERTEBRATES OFF THE NORTHERN OREGON COAST,
National Marine Fisheries Service, Seattle, Wash. Exploratory Fishing and Gear Research Base.
W. T. Pereyra, and M. S. Alton.
In: The Columbia River Estuary and Adjacent Ocean Waters, University of Washington Press, Seattle, Wash., p 444-474. 1972. 11 fig, 7 tab, 20 ref. AEC AT (49-7)-1971-Mod. No. 1.

Descriptors: Oregon, Coasts, *Benthic fauna, *Sampling, *Distribution patterns, Data collections, Depth, Carbon, Organic compounds, Sediments, *Pacific Ocean, Invertebrates, Mollusks.
Identifiers: *Epibenthic invertebrate fauna, Coelenterates, Arthropods, Echinoderms.

Results of a survey of epibenthic invertebrate fauna conducted in the waters southwest of the mouth of the Columbia River are presented. The distribution and relative abundance of invertebrates was measured along a track line at depths from 50 to 1150 fathoms. The bathymetric availability of major species groups and the relative importance of various segments of invertebrate found are considered. The fauna was sampled by trawl, grab and dredge; trawl sampling was by far the most important source of data. The sampling revealed that the relative abundance of invertebrates was approximately three times greater at depths of 100 to 375 fathoms than at shallower or deeper depths. Coelenterates, arthropods, molluscs and echinoderms made up the bulk of the catches. All species identified are presented in tabular form, along with the depth ranges in which they were found. Study results indicate that the distribution of organic carbon in surface sediments is associated with the changes in invertebrate distribution. (See also W73-08816) (Ensign-PAI)
W73-08837

BATHYMETRIC DISTRIBUTION OF THE ECHINODERMS OFF THE NORTHERN OREGON COAST,
National Marine Fisheries Service, Seattle, Wash. Exploratory Fishing and Gear Research Base.
M. S. Alton.
In: The Columbia River Estuary and Adjacent Ocean Waters, University of Washington Press, Seattle, Wash., p 475-537. 1972. 18 fig, 21 tab, 49 ref.

Descriptors: *Columbia River, Continental shelf, *Continental slope, *Benthic fauna, *Distribution patterns, Density.
Identifiers: Crinoidea, *Echinoidea, Holothuroidea, Benthic zones.

Benthonic fish and invertebrate fauna inhabiting the outer continental shelf and slope southwest of the mouth of the Columbia River were investigated by the Bureau of Commercial Fisheries and the Atomic Energy Commission. A detailed description of the bathymetric distribution of Crinoidea, Echinoidea, and Holothuroidea is presented. Assemblages of echinoderms were related to the following five benthic zones: (1) the outer sublittoral (50-75 fathoms), diversity and catch rates were small here, (2) the upper bathyal (100-250 fathoms), large catches of sea urchins and brittle stars were found, (3) the lower bathyal (275-600 fathoms), large catches of sea stars, (4) the bathyal-abyssal (650-800 fathoms), a transitional zone between the fauna found in lower bathyal depths and abyssal depths, and (5) the abyssal (850-1160 fathoms), many ophiuroids were found. In the upper bathyal zone, several species were found to have circumboreal distributions. The echinoderm fauna from the abyssal zone have multiple species subdominance. Species diversity appeared to be highest at bathyal depths of 187 to 500 fathoms and at abyssal depths of 900 to 1050 fathoms. (See also W73-08816) (Ensign-PAI)
W73-08838

BATHYMETRIC AND SEASONAL ABUNDANCE AND GENERAL ECOLOGY OF THE TANNER CRAB CHIONOECETES TANNERI RATHBUN (BRACHYURA: MAJIDAE), OFF THE NORTHERN OREGON COAST,
National Marine Fisheries Service, Seattle, Wash. Exploratory Fishing and Gear Research Base.
W. T. Pereyra.
In: The Columbia River Estuary and Adjacent Ocean Waters, University of Washington Press, Seattle, Wash., p 538-582. 1972. 10 fig, 9 tab, 58 ref.

Descriptors: *Pacific Ocean, *Continental slope, *Crabs, Life history studies, *Benthic fauna, *Invertebrates, Distribution patterns, Density, Life cycles, Radioisotopes.
Identifiers: Chionoecetes tanneri.

Deepwater investigations conducted near the Columbia River mouth showed Chionoecetes tanneri, the Tanner crab, to be present in substantial numbers on the continental slope. The Tanner crab's relation to the total epibenthic invertebrate biomass, its distribution, seasonal movements, reproduction and life history are all discussed. A life-history model for the crab was developed through a synthesis of all available life-history information. Ecological factors which may serve to determine the life-history patterns observed are explored. One conclusion is that the Tanner crab may serve as a biological transport of radionuclides. Larvae develop at the surface and could transport radiomaterial to the bottom, than developing juveniles could transport it up the slope to the area of adult residency. (See also W73-08816) (Ensign-PAI)
W73-08839

CHARACTERISTICS OF THE DEMERSAL FISH FAUNA INHABITING THE OUTER CONTINENTAL SHELF AND SLOPE OFF THE NORTHERN OREGON COAST,
National Marine Fisheries Service, Seattle, Wash. Exploratory Fishing and Gear Research Base.
M. S. Alton.
In: The Columbia River Estuary and Adjacent Ocean Waters, University of Washington Press, Seattle, Wash., p 583-634. 1972. 25 fig, 9 tab, 58 ref. AEC AT (49-7)-1971.

Descriptors: Oregon, Coasts, Fish, Distribution patterns, Density, *Data collections, Bathymetry, *Continental shelf, Continental slope, *Seasonal, Pacific Ocean.
Identifiers: *Demersal fish.

A cooperative study undertaken by the Bureau of Commercial Fisheries and the Atomic Energy Commission provided extensive information on demersal fishes off the Oregon coast. Findings related to the bathymetric occurrences and availability of individual fishes, seasonal changes in their availability and the relative importance of the various species and phylogenetic groups related to depth are discussed. Bathymetric shifts in the availability of certain dominant fishes and size distribution of fish taken, number of species encountered, and species related to depth are also examined. Trawling stations were established at various depths for sampling purposes. Species found in the study area are listed according to phylogenetic groupings. The largest accumulations of fish in the study area were obtained from the bottom depth interval of 50 to 225 fathoms; a secondary zone of fish abundance was found at 250 to 425 fathoms. Changes in fish availability were seasonal and occurred in the outer continental shelf and upper slope regions. These changes were partly attributed to bathymetric and latitudinal shifts in fish populations. (See also W73-08816) (Ensign-PAI)
W73-08840

METHODS FOR THE MEASUREMENT OF HANFORD-INDUCED GAMMA RADIOACTIVITY IN THE OCEAN,
(AEC), Division of Biology and Medicine, Washington, D.C.
C. L. Osterberg, and R. W. Perkins.
In: The Columbia River Estuary and Adjacent Ocean Waters, University of Washington Press, Seattle, Wash., p 637-662. 1972. 12 fig, 1 tab, 32 ref.

Descriptors: *Columbia River, Radioisotopes, *Sampling, *Radioactive wastes, *Analytical techniques, Water pollution sources.
Identifiers: *Radionuclides, *Gamma-ray spectrometry.

Methods for identifying and measuring radionuclides in Columbia River water at sea are discussed. Since not all plants and animals have equal affinities for the same radionuclides, simple sampling and measurement of radionuclide levels in ocean fauna and flora is not accurate. The optimum method appears to be a direct sampling of ocean water for radioactivity. In the past, large samples of water have been processed at sea, with relatively small concentrates being analyzed after return to the laboratory. Recent refinements in sampling methods are discussed. One technique employs sorption beds, which remove radionuclides from many gallons of seawater. The concentrate, when analyzed with multiparameter gamma-ray spectrometry, reveals a number of radionuclides present in the sea. This method has its drawbacks, however, and further research is necessary. (See also W73-08816) (Ensign-PAI)
W73-08841

RADIOACTIVE AND STABLE NUCLIDES IN THE COLUMBIA RIVER AND ADJACENT NORTHEAST PACIFIC OCEAN,
Puerto Rico Nuclear Center, Mayaguez.
W. O. Forster.
In: The Columbia River Estuary and Adjacent Ocean Waters, University of Washington Press, Seattle, Wash., p 663-700. 1972. 17 fig, 21 tab, 28 ref. AEC AT (45-1)-1750.

Descriptors: *Columbia River, *Radioisotopes, Chemical properties, Physical properties, Measurement, Spectrometers, Water pollution sources, *Pacific Ocean, Dilution, *Radioactive wastes.

Results from several individual projects concerning the chemical and physical behavior of several radionuclides in the Columbia River estuary and plum region are presented. All measurements of radioactivity were made by gamma-ray spectrometry. It was discovered that radionuclides associated with particulate matter or found in solution decrease in specific activity as the result of their physical decay rate, biogeochemical removal from the ecosystem, dilution by tributaries, and holdup by dams. (See also W73-08816) (Ensign-PAI)
W73-08842

RADIONUCLIDE DISTRIBUTION IN COLUMBIA RIVER AND ADJACENT PACIFIC SHELF SEDIMENTS,
Puerto Rico Nuclear Center, Mayguez.
W. O. Forster.
In: The Columbia River Estuary and Adjacent Ocean Waters, University of Washington Press, Seattle, Wash., p 701-735. 1972. 16 fig, 6 tab, 42 ref. AEC AT (45-1)-1750.

Descriptors: *Columbia River, *Radioisotopes, Carriers, *Sediments, *Radioactivity, *Tracers, Breeder reactors, Nuclear wastes.
Identifiers: Potassium-40, Bismuth-214, Zinc-65, Plume waters, Radionuclide reservoir, Transport rates, Gamma-ray spectrometry.

Results of various studies which were made to determine the complex pathways of radionuclides in Columbia River water are discussed. Mechanisms of retention, transport and distribution of various radionuclides between the water, sediment and biota are reviewed. As radionuclides are removed from the water by suspended and stream-bed sediments, a major reservoir of radioactivity is created in the ecosystem. Local rainfall, spring floods, and oxidation potentials of particular sites in the estuary are all found to be determining factors in changes in the activity levels of individual radionuclides. Tracer aspects of using paired radionuclides of different decay constants to determine transport rates of surficial sediments are illustrated. Data collected indicate that the natural radioactivity of 40K and 214Bi is stripped from the gamma spectra of nearshore sediments, while 65Zn in the plume area changes with depth, season, organic content, and particle-size distribution. (See also W73-08816) (Ensign-PAI)
W73-08843

SEDIMENT-ASSOCIATED RADIONUCLIDES FROM THE COLUMBIA RIVER,
State Univ. of New York, Stony Brook. Marine Sciences Research Center.
M. G. Gross.
In: The Columbia River Estuary and Adjacent Ocean Waters, University of Washington Press, Seattle, Wash., p 736-754. 1972. 9 fig, 9 tab, 32 ref. AEC AT (45-1)-1725.

Descriptors: *Columbia River, *Radioisotopes, Sediments, *Sediment transport, *Potassium radioisotopes, Continental shelf, Currents, Nuclear wastes, Radioactivity.
Identifiers: Bismuth-214, *Gamma-ray spectrometry.

The fate of radionuclides associated with river-borne sediments was investigated in the Columbia River from 1961 to 1963. Deposition areas for sediment-associated radionuclides are delineated, the processes controlling their distribution are identified and the amount of sediment-associated radionuclide on the continental shelf is calculated. Gamm-ray spectrometry was used to determine the abundance of radionuclides; activity levels of naturally occurring radionuclides (40K and 214 Bi) on the continental shelf were found to be nearly constant and these levels generally exceeded the levels of other radionuclides except near the river mouth. Radionuclides from the Hanford reactors and fision-product radionuclides were more abundant and widespread north of the Columbia River mouth. This is apparently due to north-setting near-bottom currents on the continental shelf off Washington and Oregon. The total reservoir of radionuclides in the continental shelf sediment may be as much as three times as large as the activity of the surface layer of sediment. (See also W73-08816) (Ensign-PAI)
W73-08844

RADIOECOLOGY OF ZINC-65 IN ALDER SLOUGH, AN ARM OF THE COLUMBIA RIVER ESTUARY,
Oregon State Univ., Corvallis. Dept. of Oceanography.
W. C. Renfro.
In: The Columbia River Estuary and Adjacent Ocean Waters, University of Washington Press, Seattle, Wash., p 755-776. 1972. 8 fig, 3 tab, 18 ref. AEC AT (45-1)-1750.

Descriptors: *Columbia River, *Estuaries, *Radioisotopes, Carriers, *Zinc radioisotopes, *Spectrophotometry, Radiochemical analysis, Environmental effects.
Identifiers: *Zinc-65, Radionuclide transfer.

The cycling of radionuclides was studied in a discrete segment of the Columbia River estuary so that the effects of tides, salinity changes and other environmental variables could be assessed. Zinc-65 levels were measured in water, sediments, algae, emergent vegetation, and in animals in order to understand how 65Zn is transferred through a small estuarine ecosystem. The zinc in the estuary water was concentrated for analysis by a method of coprecipitation; atomic absorption spectrophotometry was used to determine the stable and radioactive zinc in the plants and animals. Study results indicated that zinc activity levels increase during the spring, fall in midsummer, and continue at a low level throughout the remainder of the year. Ecological half-lives were calculated for various organisms. Those in the lowest trophic levels had the shortest ecological half-life, each succeeding trophic level showed a longer half-life. (See also W73-08816) (Ensign-PAI)
W73-08845

SEASONAL AND AREAL DISTRIBUTIONS OF RADIONUCLIDES IN THE BIOTA OF THE COLUMBIA RIVER ESTUARY,
Oregon State Univ., Corvallis. Dept. of Oceanography.
W. C. Renfro, W. O. Forster, and C. L. Osterberg.
In: The Columbia River Estuary and Adjacent Ocean Waters, University of Washington Press, Seattle Wash., p 777-798. 1972. 6 fig, 7 tab, 14 ref. AEC AT (45-1)-1750.

Descriptors: *Columbia River, *Estuaries, *Radioisotopes, *Zinc, Radioisotopes, Aquatic life, Environmental effects, Plankton, *Seasonal, Distribution patterns.
Identifiers: Starry flounder, Sand shrimp, Staghorn sculpin, Radionuclides.

The distributions of radionuclides in organisms from the Columbia River estuary are described quantitatively. The seasonal variances of the radionuclides, as well as their location in the estuary are discussed. The study concentrates on 65 Zn since it can be readily measured; other radionuclides measured in the biota include: 60Co, 54Mn, 51Cr, 46Sc and 32P. Data are presented on the following organisms; plankton, starry flounder, sand shrimp and staghorn sculpin. The plankton exhibited high, but variable, amounts of 65Zn; no seasonal or areal trends could be established. Fish and shrimp had quantities of 65Zn which varied seasonally, reaching a maximum in spring and summer. The starry flounder and staghorn sculpin from upstream showed higher radioactivity levels than those from farther downstream. During the five-year study the zinc-65 specific activity levels in the organisms declined. This appears to be linked to the fact that during the same time span the number of reactors in operation at the Hanford site was reduced from eight to three. (See also W73-08816) (Ensign-PAI)
W73-08846

TOTAL PHOSPHORUS AND PHOSPHORUS-32 IN SEAWATER, INVERTEBRATES, AND ALGAE FROM NORTH HEAD, WASHINGTON,
Washington Univ., Seattle. Coll. of Fisheries; and Washington Univ., Seattle. Lab. of Radiation Ecology.
J. S. Isakson, and A. H. Seymour.
In: The Columbia River Estuary and Adjacent Ocean Waters, University of Washington Press, Seattle, Wash., p 799-818. 1972. 8 fig, 6 tab, 24 ref.

Descriptors: *Columbia River, *Phosphorus radioisotopes, Sampling, *Seawater, *Algae, *Invertebrates, Chemical analysis, Food chains, Environmental effects, Seasonal.
Identifiers: *Phosphorus-32, North Head (Wash).

A biological survey of 32P, a radionuclide released into the waters of the Columbia River by the reactors at Hanford, was made. Monthly samples were taken of seawater, several species of invertebrates, and algae; quantitative determinations were made of 32P and total phosphorus. Seasonal variation in total phosphorus was less pronounced than variation in 32P levels; the peak levels for 32P occurred most frequently in the period from April to June. The values for the abundance of total phosphorus and of 32P in seawater varied independently. The concentration factors for each of the chemicals were different, with 32P being lower. The lesser concentration of 32P can be linked to a non-equilibrium condition for this radionuclide in seawater and biota, as well as the physical decay of 32P in the flood web. Data on phosphorus concentration levels in the tissues of razor clams and muscles are also presented. (See also W73-08816) (Ensign-PAI)
W73-08847

EFFECTS OF STRONTIUM-90 + YTTRIUM-90 ZINC-65, AND CHROMIUM-51 ON THE LARVAE OF THE PACIFIC OYSTER CRASSOSTREA GIGAS,
Washington Univ., Seattle. Coll. of Fisheries; and Washington Univ., Seattle. Lab. of Radiation Ecology.
V. A. Nelson.
In: The Columbia River Estuary and Adjacent Ocean Waters, University of Washington Press, Seattle, Wash., p 819-832. 1972. 1 fig, 3 tab, 15 ref.

Descriptors: *Columbia River, *Bays, *Radioisotopes, *Oysters, Laboratory tests, Lethal limit, Water pollution effects, Environmental effects.
Identifiers: Willapa Bay, Zinc-65, Chromium-51, Crassostrea gigas, Abnormal larvae.

The effects of certain radionuclides, notably, 65Zn, 51Cr, and 90Sr + 90Y, upon Willapa Bay oysters are discussed. The developing eggs and embryos of the oyster Crassostrea gigas, were subjected to the effects of ionizing radiation from radionuclides for 48 hrs. The concentration of radionuclides ranged from 10-8 to 10-2 Ci/liter. Abnormal larvae were defined as those larvae which had incompletely developed shells 48 hr. after fertilization. The results indicated that significant increases in abnormal oyster larvae were present in 65Zn concentrations of 10-4 Ci/liter and greater; the effects of 90Sr + 90Y and 51Cr began at 10-3 Ci/liter. The concentrations of radionuclides necessary to produce abnormal larvae were more than a million times greater than the concentrations which have been measured to date in natural environments. The relationship between laboratory findings and environmental conditions is discussed. (See also W73-08816) (Ensign-PAI)
W73-08848

ZINC-65 IN BENTHIC INVERTEBRATES OFF THE OREGON COAST,
Oregon State Univ., Corvallis. Dept. of Oceanography.
A. G. Carey, Jr.

In: The Columbia River Estuary and Adjacent Ocean Waters, University of Washington Press, Seattle, Wash., p 833-842. 1972. 3 fig, 3 tab, 11 ref. AEC AT (45-1)-1750.

Descriptors: *Pacific Ocean, *Zinc radioisotopes, *Benthic fauna, *Bottom sampling, Trawling, Carriers, Depth, Invertebrates.
Identifiers: *Zinc-65, Sublittoral fauna, Bethyal fauna, Abyssal fauna, Radionuclide uptake.

The spatial distribution of 65Zn in the benthic fauna in the Pacific Ocean adjacent to the Columbia River is discussed. Samples of benthic microfauna and larger epibenthic organisms were gathered through bottom trawling. 65Zn was concentrated by the sublittoral, bathyal and abyssal fauna. The zinc-65 concentrations varied markedly with depth; levels decrease fairly regularly with distance from the Columbia River. 65Zn apparently reaches the fauna through the food web. (See also W73-08816) (Ensign-PAI)
W73-08849

A TEN-YEAR STUDY OF MEROPLANKTON IN NORTH CAROLINA ESTUARIES: AMPHIPODS,
National Marine Fisheries Service, Washington, D.C. Systematics Lab.
A. B. Williams, and K. H. Bynum.
Chesapeake Sci, Vol 13, No 3, p 175-192, 1972. Illus.
Identifiers: Amphipods, *Estuaries, Lunar, *Mero (Plankton), *North Carolina, Plankton.

Occurrence of gammarid and caprellid amphipods in semimonthly nocturnal surface plankton samples taken on flood tide for 10 yr at 1 estuarine station and shorter periods at 11 other stations is summarized on a monthly basis. Fifty-eight spp. are identified from samples taken during the study by no single station produced this variety. The great diversity of species from stations near the sea is contrasted with the sparse and different fauna of meso-oligohaline waters. Seasonal abundance in samples is summarized for all important species on a station basis. Contrasts in density of 8 spp. in surface-bottom tows and 33 spp. in samples taken at alternate lunar phases (new-full) indicate significant behavioral differences. Nocturnal stratification varied with species; about 1/3 showed no apparent abundance in association with lunar phase, another 1/3 showed increase at new, and a final 1/3 at full moon.--Copyright 1973, Biological Abstracts, Inc.
W73-08863

A DESCRIPTION AND ANALYSIS OF COASTAL ZONE AND SHORELAND MANAGEMENT PROGRAMS IN THE UNITED STATES,
Michigan Univ., Ann Arbor. Sea Grant Program.
E. H. Bradley, Jr., and J. M. Armstrong.
Available from NTIS, Springfield, Va 22151 as COM-72 10694 Price $9.00 printed copy; $1.45 microfiche. Technical Report No 20, March 1972. 756 p, 4 tab, 4 ref, 15 append. NOAA MICHU-SG-72-204.

Descriptors: *Coasts, *Management, *Comprehensive planning, *Land management, *Legislation, Water resources development, Legal aspects, Estuaries, Reviews, Beaches, Wetlands, Optimum development plans, Planning.
Identifiers: *Coastal management, *Shoreland management.

All of the existing U.S. coastal management programs are discussed. The programs of 10 states were chosen for close examination as they are representative of the major approaches being undertaken on the state level. An overview is given of the status of shoreland management at the state level in the United States. A historical analysis describes the influence of geographical and political factors on the development of shoreland management programs. Shoreland management programs are described by type. The various issues involved in developing a comprehensive coastal zone management program, and the areas that should be examined in future research are described. (Knapp-USGS)
W73-08887

YAQUINA BAY MARINE DEVELOPMENT PLAN.
Skidmore, Owings and Merrill, Portland, Oreg.

Available from NTIS, Springfield, Va 22151 as COM-72 11305, Price $3.00 printed copy; $1.45 microfiche. Report to Economic Development Administration, Department of Commerce, August 15, 1972. 249 p.

Descriptors: *Water resources development, *Marinas, *Water sports, *Commercial fishing, *Oregon, Bays, Feasibility studies, Economics, Project planning, Land development, Recreation facilities, Tourism, Environmental effects, Ecology, Projections, Evaluation, Costs.
Identifiers: *Yaquina Bay area (Oreg).

This report is Phase III of a continuing action program which is dedicated to promote sound, environmentally compatible economic development of the Yaquina Bay area, Oregon, while preserving and enhancing its natural resources and life style. Its purpose is to establish the feasibility of expanding the marine-oriented economic base to provide a new and more stable employment opportunities. The scope of the study includes the examination of specific interrelated activities: commercial fishing, fish processing, warehousing and storage, moorage and transportation; recreational and sport fishing; supporting commercial-retail facilities, including marine repair and supply; marine-oriented industrial development, including activities related to the Marine Science Center; and transportation bearing directly upon marine-oriented facilities. The culmination of Phase III of this program has resulted: (a) in the recommendation of specific policies to guide the future marine and recreational development of the Yaquina Bay area, and (b) in the citing of specific projects as potential candidates for Federal financial assistance. This material sets a comprehensive framework for healthy environmentally compatible, economic growth, and will allow the Task Force to seek a 'pre-application' interview with Federal authorities for implementative support. (Woodard-USGS)
W73-08888

GRAYS HARBOR ESTUARY, WASHINGTON: REPORT 4, SOUTH JETTY STUDY,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 08B.
W73-08889

MERCURY IN SEDIMENTS FROM THE THAMES ESTUARY,
Institute of Geological Sciences, London (England). Geochemical Div.
For primary bibliographic entry see Field 05A.
W73-08902

RESULT OF FLUVIAL ZINC POLLUTION ON THE ZINC CONTENT OF LITTORAL AND SUB-LITTORAL ORGANISMS IN CARDIGAN BAY, WALES,
University Coll. of Wales, Aberystwyth. Dept. of Zoology.
For primary bibliographic entry see Field 05B.
W73-08925

INTERTIDAL SUBSTRATE RUGOSITY AND SPECIES DIVERSITY,
University of Southern California, Los Angeles.
For primary bibliographic entry see Field 05C.
W73-08928

THE EFFECT OF OIL POLLUTION ON SURVIVAL OF THE TIDAL POOL COPEPOD, TIGRIOPUS CALIFORNICUS,
California State Univ., Northridge. Dept. of Biology.
For primary bibliographic entry see Field 05C.
W73-08929

THE USE OF COLIPHAGE AS AN INDEX OF HUMAN ENTEROVIRUS POLLUTION IN AN ESTUARINE ENVIRONMENT,
New Hampshire Univ., Durham.
For primary bibliographic entry see Field 05A.
W73-08951

ESTUARINE NITRIFICATION,
Rutgers - The State Univ., New Brunswick, N. J.
For primary bibliographic entry see Field 05B.
W73-08971

CONCENTRATION FACTORS OF CHEMICAL ELEMENTS IN EDIBLE AQUATIC ORGANISMS,
California Univ., Livermore. Lawrence Livermore Lab.
For primary bibliographic entry see Field 05B.
W73-08992

THE ECOLOGY OF MORECAMBE BAY: I. INTRODUCTION,
Freshwater Biological Association, Ambleside (England).
J. Corlett.
J Appl Ecol. Vol 9, No 1, p 153-159. 1972. Illus.
Identifiers: Bays, *Ecology, England, *Morecambe Bay (UK).

Between 1968 and 1970 a study of the ecology of Morecambe Bay in north-west England was undertaken as part of a feasibility study for a Morecambe Bay Barrage beign carried out under the authority of the Water Resources Board. The main aspects of the feasibility study are described and an outline of the biological problems is given. This is an introduction to a series of papers describing some of the investigations in more detail. (See also W72-14338 and W72-14339)--Copyright 1972, Biological Abstracts, Inc.
W73-09065

THE ECOLOGY OF MORECAMBE BAY: V. THE SALT MARSHERS OF MORECAMBE BAY,
Nature Conservancy, Norwich (England). Coastal Ecology Research Station.
A. J. Gray.
J Appl Ecol. Vol 9, No 1, p 207-220. 1972. Illus.
Identifiers: Bays, Construction, Ecology, England, Grasses-M, Marshes, *Morecambe Bay (UK), Range, Reservoirs, *Salt marshes, Sheep, Tidal relations, Vegetation.

An account is given of the history, topography, tidal relations and management of the salt marshes in the northern part of Morecambe Bay (England). Their recent history is one of progressive marsh development, a process accelerated by the building of breakwaters and embankments in the upper parts of the estuaries, and by the piecemeal reclamation of land for agriculture or as a result of railway construction. The fluctuations of the low water channels of the rivers draining into the bay have a significant effect on marsh development, producing, at many sites, intermittent phases of erosion and growth. At the present time, 1485 ha of salt marsh in the bay are confined to the upper 2.5 m of a 9.5 m tidal range, the lowest limit of the vegetation being at about 3.9 m A.O.D. (above ordnance datum). Features of the marshes include

the highly unstable lower zones, the dominance of perennial grasses, and the presence of terraces. They are heavily grazed by sheep and turf is removed for sale. The major factors which may operate on the vegetation of the bay in the event of reservoir construction are briefly discussed. (See also W72-14338 and W72-14339)--Copyright 1972, Biological Abstracts, Inc.
W73-09066

THE ECOLOGY OF MORECAMBE BAY: VI. SOILS AND VEGETATION OF THE SALT MARSHES: A MULTIVARIATE APPROACH,
Nature Conservancy, Norwich (England). Coastal Ecology Research Station.
A. J. Gray, and R. G. H. Bunce.
J Appl Ecol. Vol 9, No 1, p 221-234. 1972. Illus.
Identifiers: Bays, Calcareous soils, Cluster analysis, Ecology, Fertile, Marshes, *Morecambe Bay (UK), Nutrients, *Salt marshes, Sands, Silt, Sodium, Soils, Tidal relations, Vegetation.

Data from 168 samples of soils and vegetation on the salt marshes of Morecambe Bay, (England) were examined by a combination of association-analysis and principal component analysis. The major trend of variation was provided by the contrast between the vegetation of calcareous nutrient-poor sands with that of comparatively fertile organic silty soils, reflecting the complex of factors associated with pedogenesis. A second component of variation, contrasting soil Na content with elevation, reflected the factors related to tidal submergence. Cluster analysis of the association-analysis group mean data enabled the sample sites ranged across the spectrum of soil variation to be classified as belonging to 1 of 4 marsh types: mature marshes, high-level saltings, low-level saltings, or pioneer zones and unvegetated areas. At the same time local differences in vegetation could be related to soil type as defined by the position of the sites on a 2-dimensional representation of the first 2 components. Whereas areas of continuous vegetation may be limited by tidal factors to elevations above 4.5 m A.O.D. (above ordnance datum), point-to-point variation in the vegetation above this level reflects the interaction of such factors with local variation in soil type.--Copyright 1972, Biological Abstracts, Inc.
W73-09067

PLASTIC PACKAGING AND COASTAL POLLUTION,
Aston Univ., Birmingham (England). Dept. of Chemistry.
For primary bibliographic entry see Field 05G.
W73-09071

A MATHEMATICAL MODEL OF THE TIDE IN THE POTOMAC RIVER,
Johns Hopkins Univ., Baltimore, Md. Chesapeake Bay Inst.
S. R. Rives, Jr.
Technical Report 80 (Reference 73-6), February 1973. 28 p, 12 fig, 1 tab, 8 ref. NR 083-016, NOOO 14-67-A-0163-0006.

Descriptors: *Estuaries, *Potomac River, *Tidal effects, *Water level fluctuations, Model studies, *Mathematical models, Tidal waters, Tidal streams, Mannings equation, Roughness (Hydraulic).
Identifiers: *Tidal range.

That portion of the Potomac River which is influenced by the oceanic tide extends from Little Falls just north of Washington, D.C. to Point Lookout at the mouth, a distance of 185 kilometers. Tidal motions in long narrow bodies of water such as the Potomac can be described using a homogeneous one-dimensional mathematical model. Large scale cross-channel phenomena are effectively eliminated by the geometry, and momentum fluxes with tidal periods are confined to directions closely parallel to the basin axis. The effect of axis curvature should be small in the Potomac since the radii of curvature are large compared to the river width (except perhaps at Mathias Pt.). When the model results were applied to the Potomac River, good agreement was obtained with observed mean range and mean high water phase. Manning's roughness coefficient (assumed spacially constant) is near the lower end of tabulated values. (Woodard-USGS)
W73-09080

CLAY MINERALOGY OF QUATERNARY SEDIMENTS IN THE WASH EMBAYMENT, EASTERN ENGLAND,
Imperial Coll. of Science and Technology, London (England). Dept. of Geology.
For primary bibliographic entry see Field 02J.
W73-09083

03. WATER SUPPLY AUGMENTATION AND CONSERVATION

3A. Saline Water Conversion

DESAL ION EXCHANGE FOR DEMINERALIZATION AT SANTEE, CALIFORNIA,
Santee County Water District, Calif.
For primary bibliographic entry see Field 05D.
W73-08975

CARBON ADSORPTION AND ELECTRODIALYSIS FOR DEMINERALIZATION AT SANTEE, CALIFORNIA,
Santee County Water District, Calif.
For primary bibliographic entry see Field 05D.
W73-08976

3B. Water Yield Improvement

AN APPRAISAL OF POTENTIAL WATER SALVAGE IN THE LAKE MCMILLAN DELTA AREA, EDDY COUNTY, NEW MEXICO,
Geological Survey, Albuquerque, N. Mex.
E. R. Cox, and J. S. Havens.
Geological Survey open-file report, March 1973. 71 p, 14 fig, 8 tab, 11 ref.

Descriptors: *Water conservation, *New Mexico, *Evapotranspiration control, *Phreatophytes, *Tomarisk, Reservoirs, Evapotranspiration, Water yield improvement.
Identifiers: *Lake McMillan (N Mex).

The amount of w ter used by saltcedar in the area of the old delta of Lake McMillan, New Mexico, and the amount of water that might be salvaged by eradication of saltcedar by construction of floodways through the delta area are estimated. Saltcedar growth increased from about 13,700 acres in 1952 to about 17,100 acres in 1960, a 25% increase. Most of this increase was in the a real density range near zero to 30%. The estimated average transpiration of phreatophytes in the Artesia to Lake McMillan reach is 29,000 acre-feet of water per year. In the reach from Artesia to the Rio Penasco, where the regional water table is above the Pecos River, saltcedar eradication might salvage from 10,000 to 20,000 acre-feet of water per year for use downstream. From the Rio Penasco to Lake McMillan, the river is perched above the water table; therefore, elimination of the saltcedar would probably not increase flow in the river, nor would drains be effective. Clearing in this reach, however, might increase the flow at Major Johnson Springs below Lake McMillan. Floodways through this reach would eliminate some evapotranspiration but might increase the sediment deposited by floodwaters in Lake McMillan. (Knapp-USGS)
W73-08493

MODIFYING PRECIPITATION BY CLOUD SEEDING,
South Dakota School of Mines and Technology, Rapid City.
A. S. Dennis.
Journal Soil Water Conservation, Vol 25, No 3, p 88-92, May-June 1970. 4 fig, 2 tab, 20 ref.

Descriptors: *Weather modification, *Cloud seeding, Cloud physics, *Precipitation (Atmospheric), *Silver iodide, Snow, Rainfall, Convection, Condensation, Nucleation, Mathematical models, Bibliographies, Orography, On-aite tests, Mexico, Great Plains.
Identifiers: Switzerland, Argentina, USSR, Israel, Phillippines, Caribbean, Ice nuclei, Orographic precipitation, Orographic clouds.

Weather modification research has greatly increased understanding of cloud processes and effects of different seeding treatments. The most significant advancement has been the development of numerical models that simulate cloud behavior and predict probable seeding effects. A second advancement has been widespread adoption of stratifying data collected in field experiments, such as according to wind direction, temperature at a selected level, or presence or absence of weather fronts. Every raindrop reaching the ground forms around an embryo. Natural embryos include droplets formed around unusually large condensation nuclei and large droplets resulting from chance collisions among ordinary cloud droplets. Artificial embryos, such as those stimulated by dry ice pellets or silver iodide crystals, are described along with experiments with orographic and convective clouds, the latter on a selective or an area basis. Also discussed are storm abatement projects in switzerland, Argentina, USSR, and the Great Plains of the U S. Orographic seeding can produce precipitation of about 10%, but the effects of seeding convective clouds are still uncertain. (USBR)
W73-08521

3C. Use of Water of Impaired Quality

INVESTIGATION OF FACTORS RELATIVE TO GROUNDWATER RECHARGE IN IDAHO,
Idaho Univ., Moscow. Dept. of Hydrology.
For primary bibliographic entry see Field 05D.
W73-08456

THE FLOURISHING DISTRICT HEATING BUSINESS,
For primary bibliographic entry see Field 06D.
W73-08612

HEATED WATER: A USE FOR A HEADACHE.

Electrical World, Vol 177, No 11, p 26-27, June 1, 1972. 1 fig.

Descriptors: *Heated water, *Experimental farms, *Irrigation programs, *Microclimatology, *Frost protection, Horticulture, Agriculture, Vegetable crops, Demonstration farms, Fruit crops, Multiple-purpose projects, Crop production, Crop response, Growth rates, *Oregon.

An experimental program developed by the Eugene (Oregon) Water and Electric Board, which examines the possible uses of heated water in horticulture, is presented. Twenty-one thousand feet of buried pipeline carry heated water to an irrigation and sprinkler system which services 170 acres of farm land. On this land a large variety of crops

are grown to examine the effects of thermal water upon crop production, growth periods and crops which are usually grown in warmer climates. Thermal water in irrigation is as good as cold water, although flood irrigation can be harmful. Heated water also is an effective form of frost protection and a sun shield when used in a sprinkler system. The difficulties which were encountered in using heated water were minor and could be avoided through the development of techniques in dealing with this new tool. (Jerome-Vanderbilt)
W73-08630

QUALITY STANDARD FOR IRRIGATION WATER IN THE TROPICS,
Hawaii Univ., Honolulu. Dept. of Agronomy and Soil Science.
S. A. El-Swaify.
In: Water Resources Seminar Series No. 1, January 1972. Water Resources Research Center, University of Hawaii, Honolulu, p 53-66.

Descriptors: *Irrigation water, *Tropical regions, *Water quality standards, Soils, Crops, Hawaii, Salts, Leaching, Salinity, Hydraulic conductivity, Anions, Permeability.
Identifiers: Crop tolerance limit, Oxisol, Aridosol.

New water quality standards are needed for irrigating highly weathered soils in the tropics, which should feature higher allowable salinity levels and sodium proportions relative to other cations and stronger emphasis on possible effects of dominant anions, thereby creating an expansion in water resources available for irrigation by putting to use water which is normally considered unsuitable. Just as the U.S. Salinity Laboratory's system proved inadequate for Oxisols and Aridisols, any other attempted generalizations concerning irrigation water quality in the tropics should be avoided due to wide diversity among the soils of these regions. It is important to remember that irrigation water management is a very major factor for modifying the quality of irrigation water. This may be clearly illustrated by the fact that the depth of movement of a given quantity of water--the leaching requirement--into a given soil is strongly dependent on the water application method. Water and accompanying soluble components percolate deeper into soil when unsaturated conditions are maintained during irrigation. It is possible to improve leaching efficiency by proper choice of irrigation method, as it is important to change the allowable level of salinity in irrigation water depending on the irrigation method. (Auen-Wisconsin)
W73-08652

EFFECTS OF MUNICIPAL WASTE WATER DISPOSAL ON THE FOREST ECOSYSTEM,
Pennsylvania State Univ., University Park. School of Forest Resources.
For primary bibliographic entry see Field 05D.
W73-08731

3D. Conservation in Domestic and Municipal Use

MEASURING BENEFITS GENERATED BY URBAN WATER PARKS,
Dornbusch (David M.) and Co., Inc., San Francisco, Calif.
For primary bibliographic entry see Field 06B.
W73-08659

HYDROPNEUMATIC STORAGE FACILITIES.
Illinois State Environmental Protection Agency, Springfield. Div. of Public Water Supplies.
For primary bibliographic entry see Field 05G.
W73-08671

FUNCTIONAL WATER AND SEWERAGE PLAN AND PROGRAM, CATAWBA REGIONAL PLANNING COUNCIL.
LBC and W Associates, Columbia, S.C.
For primary bibliographic entry see Field 06B.
W73-08977

LOWCOUNTRY REGION FUNCTIONAL WATER AND SEWER PLAN AND PROGRAM.
LBC and W Associates, Columbia, S.C.
For primary bibliographic entry see Field 06B.
W73-08978

SOUTH SANTA CLARA COUNTY WATER PLANNING STUDY COMPLETION REPORT.
Santa Clara County Flood Control and Water District, San Jose, Calif.
For primary bibliographic entry see Field 06B.
W73-08979

MALIBU MASTER PLAN OF STORM DRAINS.
Los Angeles County Engineer Dept., Calif.
For primary bibliographic entry see Field 05G.
W73-08980

INITIAL WATER, SEWERAGE AND FLOOD CONTROL PLAN REPORT, JOB 4800.
Duncan and Jones, Berkeley, Calif.
For primary bibliographic entry see Field 06B.
W73-08981

WATER AND SEWER FACILITIES, OSCEOLA COUNTY.
Beck (R. W.) and Associates, Denver, Colo.
For primary bibliographic entry see Field 06B.
W73-08984

WATER SUPPLY PLAN FOR THE SOUTHEASTERN CONNECTICUT REGION: SUMMARY.
Southeastern Connecticut Water Authority, Norwich.
For primary bibliographic entry see Field 06B.
W73-08985

WATER SUPPLY PLAN FOR THE SOUTHEASTERN CONNECTICUT REGION, VOLUME I, INVENTORY.
Southeastern Connecticut Water Authority, Norwich.
For primary bibliographic entry see Field 06B.
W73-08986

STATEWIDE LONG-RANGE PLAN FOR THE MANAGEMENT OF THE WATER RESOURCES OF CONNECTICUT, PHASE I REPORT, 1971.
Connecticut Interagency Water Resources Planning Board, Hartford.
For primary bibliographic entry see Field 06B.
W73-08987

LAND USE AND DEVELOPMENT ALONG THE TENNESSEE RIVER IN THE TARCOG REGION.
Top of Alabama Regional Council of Governments, Huntsville.
For primary bibliographic entry see Field 06B.
W73-08988

INCOG FUNCTIONAL PLAN SUPPLEMENTS (WATER AND SEWER, HOUSING AND OPEN SPACE).
Indian Nations Council of Governments, Tulsa, Okla.
For primary bibliographic entry see Field 06B.
W73-08989

INTERIM RIVER REPORT, NOVEMBER 1970.
Interagency Riverfront Committee, Minneapolis, Minn. Design Team.
For primary bibliographic entry see Field 06B.
W73-08990

ROLE OF WATER IN URBAN PLANNING AND MANAGEMENT,
Geological Survey, Arlington, Va. Water Resources Div.
For primary bibliographic entry see Field 04C.
W73-09082

3E. Conservation in Industry

AN EXAMINATION OF THE ECONOMIC IMPACT OF POLLUTION CONTROL UPON GEORGIA'S WATER-USING INDUSTRIES,
Georgia Inst. of Tech., Atlanta. Engineering Experiment Station.
For primary bibliographic entry see Field 05G.
W73-08453

CRUDE OIL AND NATURAL GAS PRODUCTION IN NAVIGABLE WATERS ALONG THE TEXAS COAST (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Galveston, Tex.
For primary bibliographic entry see Field 05G.
W73-08661

3F. Conservation in Agriculture

ESTIMATING THE PRODUCTIVITY OF IRRIGATION WATER FOR SUGARCANE PRODUCTION IN HAWAII,
Hawaii Univ., Honoiulu. Water Resources Research Center.
L. B. Rankine, J. R. Davidson, and H. C. Hogg.
Available from the National Technical Information Service as PB-220 007, $3.00 in paper copy, $1.45 in microfiche. Technical Report No. 56, June 1972. 66 p, 9 fig, 7 tab, 14 ref, 3 append. OWRR A-012-HI (2).

Descriptors: *Sugarcane, *Irrigation water, Soil moisture, *Yield equations, *Hawaii, *Crop production, Productivity, Evapotranspiration.
Identifiers: Operational models.

This study concentrated on the development of an operational model. Data were collected from sugar plantations located in two sugar-producing areas chosen to represent the various sugar-production conditions in the state. Area I depended exclusively on water from artesian wells for irrigation. Irrigation in Area II depended mostly on stored surface runoff rainfall and is supplementary in nature. Both areas differ in their physical terrain. The study draws heavily from and builds on the experiences of previous investigations in the general areas of agricultural economics and plant sciences. From an integration of these ideas, the modified composite variable was developed as a measure of water adequacy in cane production. Most of the information required to construct this variable is available from management records. Pan evaporation data were incomplete because standard evaporation pans were only recently installed and then only in a few areas. To overcome this difficulty, techniques were developed to estimate evapotranspiration for the two study areas utilizing available pan data together with other relevant indicators.
W73-08454

AN ANALYTICAL INTERDISCIPLINARY EVALUATION OF THE UTILIZATION OF THE WATER RESOURCES OF THE RIO GRANDE IN NEW MEXICO,
New Mexico State Univ., University Park. Dept. of Agricultural Economics.

For primary bibliographic entry see Field 06B.
W73-08458

IMPROVED METHOD FOR DETERMINATION OF XANTHOPHYLL IN FRESH ALFALFA AND WET FRACTIONS,
Agricultural Research Service, Berkeley, Calif. Western Marketing and Nutrition Research Div.
For primary bibliographic entry see Field 05A.
W73-08602

QUALITY STANDARD FOR IRRIGATION WATER IN THE TROPICS,
Hawaii Univ., Honolulu. Dept. of Agronomy and Soil Science.
For primary bibliographic entry see Field 03C.
W73-08652

DRIP IRRIGATION IN SUGAR CANE,
Hawaii Univ., Honolulu. Dept. of Agronomy and Soil Science.
P. C. Ekern.
In: Water Resources Seminar Series No. 1, January 1972. Water Resources Research Center, University of Hawaii, Honolulu, p 69-72.

Descriptors: *Water conservation, *Irrigation, *Hawaii, Tropical regions, Irrigation practices, Crop production, Evaporation control, Water distribution (Applied).
Identifiers: *Drip irrigation.

Consumptive use of water by sprinkler and drip irrigated sugarcane was measured by four hydraulic load cell lysimeters at the Kunia substation, Hawaii. The original one-eye cane transplants were set in Molokai latosol in October 1968. Water use by the full canopy of sprinkler irrigated cane for both plant crop and ratoon approximated the evaporation from a ground level class A pan and often equalled or exceeded the full equivalent value of the local net radiation, indicative of positive heat advection. The fraction of sunlight converted into net radiation had a strong seasonal change from 0.53 in summer to 0.38 in winter over the cane. Drip replaced sprinkler irrigation in the fall of 1970. With full canopy, both the plant crop and ratoon cane used only 0.75 to 0.8 of the water from that used by sprinkler irrigated cane. Rainfall percolated through the 5 ft depth of soil in the lysimeters and removed approximately 400 lbs of nitrate/acre in the 15 inches of percolate during the winter of 1968-1969, and again in the 30 inches of percolate during the winter of 1970-1971. Yield and growth of cane was satisfactory for both the sprinkler and drip irrigation methods. (Auen-Wisconsin)
W73-08653

CROPPING PATTERN, YIELDS AND INCOMES UNDER DIFFERENT SOURCES OF IRRIGATION (WITH SPECIAL REFERENCE TO IADP DISTRICT ALIGARH, U.P.),
Pant Coll. of Tech., Pantnagar (India).
T. V. Moorti, and J. W. Mellor.
Indian Journal of Agricultural Economics, Vol 27, No 4, p 117-125, October-December 1972. 10 tab, 2 ref.

Descriptors: *Irrigation practices, *Crops, *Income, *Economic impact, Water supply, Agriculture, Farms, Water costs, Water quantity, Irrigation water, Irrigation efficiency, Management, Wheat.
Identifiers: *Cropping pattern, *India, IADP district Aligarh, Economic analysis, Gross returns, Tube-wells, Persian wheels.

Irrigation technology is in a transitional stage in India where both traditional and new methods are being employed simultaneously. Traditional methods utilizing Persian wheels and 'charsa' cannot supply enough water for the new high-yielding varieties of crops. Through use of more recent techniques, these new varieties have greatly increased the returns to irrigation. State and private tube-wells are among the improved sources of irrigation. This transitional stage may have resulted in variations in the cropping pattern, yields, and incomes of farmers. In this study, an attempt is made to assess the changes in the cropping pattern as influenced by increased availability of irrigation. The specific objectives are: (1) to analyze the differences in cropping pattern and yield under different sources of irrigation; and (2) to analyze the differences in gross incomes from various crops under different sources of irrigation. It is concluded that private tube-well farms have better control of water supply in terms of its timely availability in adequate quantity which results in higher cropping intensity, yields, and therefore higher incomes. The two basic factors in irrigation--the quantity and timing of water application--result in the variations in farming pattern ultimately affecting incomes. (Bell-Cornell)
W73-08658

SOIL AND WATER CONSERVATION COMMISSION AND DISTRICTS.
For primary bibliographic entry see Field 06E.
W73-08704

YELLEN V. HICKEL (SUIT TO COMPEL ENFORCEMENT OF THE RECLAMATION LAW).
For primary bibliographic entry see Field 06E.
W73-08707

WATER AND SEWERAGE DEVELOPMENT PLAN, SUMTER COUNTY, SOUTH CAROLINA.
Palmer and Mallard and Associates, Inc., Sumter, S.C.
For primary bibliographic entry see Field 06B.
W73-08982

TRIALS OF N-FERTILIZATION ON DURUM WHEAT WITH REFERENCE TO THE POSSIBILITY OF LEAF DIAGNOSIS, (IN ITALIAN),
Bari Univ. (Italy). Istituto di Agronomia.
A. Patruno.
Riv Agron. Vol 6 No 1, p 13-27. 1972 Illus. (English summary).
Identifiers: Diagnosis, Durum wheat, Fertilization, Leaf, *Nitrogen, *Wheat-M, Yields.

In 2-yr experiments with the cultivar 'Capeiti 8' the maximum grain yield was obtained using 80 kg/ha of N. The fertilization increased straw yield, number of kernels per hectare, and decreased yellow berry, weight of kernels and apparent specific weight. The straw yield was due to increased height, thickness or tillering of culms. The N-content of leaves increased with fertilizer rates. It decreased from jointing until flowering and from the highest leaves to the last 3. However, it varied from year to year and cannot represent a fertility index of the soil. The N-content of the leaves showed several correlations with straw yield, number of kernels per hectare, but not with grain yield. The ratio between the N-content of the leaves harvested at jointing and that of the earing or flowering was correlated with grain yield in the second yr, when the winter rainfall was more than in the first yr and the N-fertilization showed a better effect. Due to the drought the N-content in the kernel was higher in the first year: it increased with N-fertilization in both years, with increasing straw/grain ratio and with decreasing weight of kernels and yellow berry.--Copyright 1972, Biological Abstracts, Inc.
W73-09021

EFFECT OF DIFFERENT NITROGEN FERTILIZERS ON THE PRODUCTIVITY OF FLOODED RICE, (IN PORTUGUESE),
N. Leite, H. Gargantini, A. G. Gomes, and T. Igue.
Bragantia. Vol 29 No 1, p 263-272. 1970. (English summary).
Identifiers: Ammonium, Cal-Nitro, Castor-Bean-D, Fertilizers, Flooded rice, Mead, *Nitrogen, Crop productivity, *Rice-M, Sulfates.

The fertilizers tested were: castorbean mead, ammonium sulfate and Cal-Nitro at 3 different levels. A constant amount of K and P was applied to all treatments. There was a significant increase on rice grain production after application of N fertilizers. Castorbean mead was the most effective in increasing the yield, followed by ammonium sulfate and Cal-Nitro.--Copyright 1972, Biological Abstracts, Inc.
W73-09022

RICE FERTILIZATION: STUDY OF THE EFFECT OF NITROGEN, PHOSPHORUS, MICRONUTRIENTS AND LIME, (IN PORTUGUESE),
N. Leite, H. Gargantini, L. S. Hungria, and T. Igue.
Bragantia. Vol 29 No 1, p 273-285. 1970. (English summary).
Identifiers: Fertilization, Lime, *Nitrogen, Nutrients, *Phosphorus, *Rice-M, Yield.

N and P were applied at levels of 0, 40, and 80 kg/ha. Lime was applied at levels of 5 and 3 t/ha in organic and clayey soils, respectively. Seeds of 'Iguape-agulha' were utilized. Cultivation was under the flooding system. Planting was done directly with seed. A great response to N fertilizer was noted, even at higher doses. In 6 of the 13 experiments, there was some response to P. No response to micronutrients or to liming was noticed.--Copyright 1972, Biological Abstracts, Inc.
W73-09023

EFFECTS OF NITROGENOUS AND PHOSPHOROUS FERTILIZATION ON RICE CULTIVATED IN FLOODED SOILS, (IN PORTUGUESE),
N. Leite, H. Gargantini, and L. S. Hungria.
Bragantia. Vol 29 No 1, p 115-125. 1970. (English summary).
Identifiers: *Brazil, Fertilization, Flooded soils, Nitrogenous, Oryza-Sativa-M, *Phosphorous, *Rice-M, Soils, Yield.

Experiments on Oryza sativa for N were carried out in clayey lowland and for P, in organic lowland soils in Sao Paulo, Brazil. A significant increase in production was obtained with N or P fertilizer applications in most cases.--Copyright 1972, Biological Abstracts, Inc.
W73-09024

IRRIGATION AFTEREFFECT ON THE FIRST AGRICULTURAL CYCLE OF TWO FORAGE GRASSES (DACTYLIS GLOMERATA L. AND FESTUCA PRATENSIS L.), (IN FRENCH),
Institut National de la Recherche Agronomique, Dijon (France).
S. Meriaux.
Ann Agron (Paris). Vol 22 No 1, p 95-111. 1971. (English summary).
Identifiers: Agricultural cycles, Dactylis-Glomerata-M, Festuca-Pratensis-M, *Forage grasses, Fructose, Grasses-M, Irrigation aftereffects, Storage, Stubble, Weight.

The adverse irrigation aftereffect on the yield of grasses during the first agricultural cycle over several years may be due to some depletion of the irrigated plant when subjected to intensive cultivation incompatible with proper build-up of reserves. The trend of regrowth in tilled land, showing the adverse irrigation aftereffects, is reproduced by the biological test, whereas the fructose content in the various parts of the plant changes erratically. Regrowth in tilled land increases with the weight

of the stubble, the tillering sprouts and the soluble-N content in each of these fractions. Regrowth in darkness is unrelated with the fructose weight but correlates with the weight of the stubble, the tillering sprouts and that of the fructoses in the stubble. Irrigation aftereffects on the yield over the first agricultural cycle of the following year may be due to the reduced weight of the stubble and tillering sprouts brought about by such treatment, and also to the lower weight of the stored sugars. The effect can be estimated and forecast by determining the weight of the storage organs.--Copyright 1972, Biological Abstracts, Inc.
W73-09025

IRRIGATED AGRICULTURE AS A METHOD OF DESERT SOIL RECLAMATION (IN RUSSIAN),
For primary bibliographic entry see Field 02G.
W73-09031

THE GROWTH AND STAGNATION OF AN URBAN FRANCE MARKET GARDENING REGION: VIRGINIA, SOUTH AUSTRALIA,
Adelaide Univ. (Australia). Dept. of Geography.
D. L. Smith.
Aust Geogr. Vol 12, No 1, p 35-48. 1972. Illus.
Identifiers: *Australia, Gardening, *Irrigation, Crop production, Stagnation, Urban areas, Vegetables, Water utilization.

The role of irrigation on market gardens in the Virginia Region, the sources of water used, and the irrigation practices adopted were studied. Attention is given to the nature of the water resources of the region, the effects of exploitation upon them, and the efforts which have been made to control their use. The likely effects of these control measures on the future of vegetable production in the region are assessed.--Copyright 1972, Biological Abstracts, Inc.
W73-09068

04. WATER QUANTITY MANAGEMENT AND CONTROL

4A. Control of Water on the Surface

AN APPRAISAL OF POTENTIAL WATER SALVAGE IN THE LAKE MCMILLAN DELTA AREA, EDDY COUNTY, NEW MEXICO,
Geological Survey, Albuquerque, N. Mex.
For primary bibliographic entry see Field 03B.
W73-08493

PLANS FOR REDUCTION OF SHOALING IN BRUNSWICK HARBOR AND JEKYLL CREEK, GEORGIA,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 08B.
W73-08512

SOME DESIGNS AND ANALYSES FOR TEMPORALLY INDEPENDENT EXPERIMENTS INVOLVING CORRELATED BIVARIATE RESPONSES,
California Polytechnic State Univ., San Luis Obispo. Dept. of Computer Science and Statistics.
S-C. Wu.
Biometrics, Vol 28, No 4, p 1043-1061, December 1972. 1 fig, 6 ref, 1 append.

Descriptors: *Statistical methods, *Estimating, *Design, *Runoff, Streamflow forecasting.
Identifiers: Treatment effects, Variance, Continued covariate design, Balanced crossover design, Augmented crossover design, Maximum likelihood.

Designs and analyses are derived for experiments with two experimental units where responses are correlated within and independent among time periods. Fisher's information function for the treatment parameter is maximized to obtain most informative designs for estimating a treatment effect. In the absence of pre-test or historical data on the two units, the most informative design is always a balanced crossover. With historical data, the design is either a continued covariate or an augmented crossover. Efficient analyses of continued covariate and balanced crossover designs are shown to be examples of maximum likelihood (ML) estimation and the analysis of covariance. For the augmented crossover designs, (ML) methods and Wilks' lambda criterion are used to provide efficient large sample procedures. It is shown that use of a most informative design and efficient analysis instead of more familiar designs and analyses can result in a sizable decrease in the variance of the treatment effect estimator. (Little-Battelle)
W73-08546

ORGANIZATION OF LAND AREA IN WASHINGTON FOR WATER AND LAND USE PLANNING,
Washington State Univ., Pullman. Dept. of Agronomy and Soils.
For primary bibliographic entry see Field 06E.
W73-08607

CREATION OF CONDITIONAL DEPENDENCY MATRICES BASED ON A STOCHASTIC STREAMFLOW SYNTHESIS TECHNIQUE,
Arizona Univ., Tucson. Dept. of Systems Engineering.
For primary bibliographic entry see Field 02E.
W73-08608

KNOW WHAT'S HAPPENING IN YOUR WATER SYSTEM,
Parsons, Brinckerhoff, Quade and Douglas, Inc., New York.
H. L. Michel, and J. P. Wolfner.
The American City, Vol 87, No 6, p 80-88, June 1972. 2 fig, 2 tab, 7 ref, 5 p.

Descriptors: *Water distribution (Applied), *Hydraulic models, *Computer programs, *Digital computers, Simulation analysis, Networks, Pipes, Pumps, Head loss, Flow, Water management (Applied), Mathematical models, Systems analysis, Water demand, Analog computers.
Identifiers: *Hardy Cross method, *Newton-Raphson method.

To manage even a moderate-size water utility efficiently, one must be able to estimate the consequence of any operational changes. To do so accurately requires a hydraulic analysis of the distribution network, simulating any number of eventualities. Presented is a digital computer program that overcomes many of the limitations in other hydraulic computer programs, and is easy to use. It assures convergence to a solution, is capable of analyzing a large system, and automatically formulates the initial assumptions required. Computer results are displayed in a format easily used in conjunction with system maps of the utility, thereby eliminating the need to transfer results to special-purpose diagrams. After discussing the disadvantages of the Hardy Cross method and analog computers and the advantages of digital computers in such hydraulic analysis, the program developed herein is described in detail. The program utilizes the Newton-Raphson method which has been proved already in actual practice. Specifically discussed are eleven critical features incorporated into the program, and the problems encountered and overcome in organizing the data. Application of the program to a hypothetical city is included. This program is less costly and time-consuming, and its results are more easily understood by non-technical personnel. (Bell-Cornell)
W73-08655

VALUATION OF TIMBER, FORAGE AND WATER FROM NATIONAL FOREST LANDS,
Forest Service (USDA), Tucson, Ariz. Rocky Mountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 06B.
W73-08657

NEW ENGLAND RIVER BASINS COMMISSION--1972 ANNUAL REPORT.
New England River Basins Commission, Boston, Mass.
For primary bibliographic entry see Field 06E.
W73-08676

STATEMENT OF FINDINGS--BAL HARBOUR, FLORIDA, PARTIAL BEACH RESTORATION, BEACH EROSION CONTROL AND HURRICANE PROTECTION PROJECT, DADE COUNTY, FLORIDA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Jacksonville, Fla.

Available from National Technical Information Service, Springfield, Virginia, as EIS-FL-72-5591-F. Price: $4.75 in paper copy, $1.45 in microfiche. May 1972. 51 p, 1 plate.

Descriptors: *Florida, *Environmental effects, *Beach erosion, *Recreation, *Artificial beaches, Hurricanes, Borrow pits, Silting, Beaches, Dredging, Aquatic environment, Excavation, Erosion control, Shore protection.
Identifiers: *Environmental Impact Statements, *Coastal zone management, *Bal Harbour (Florida).

This project consists of beach restoration of an 0.85 mile reach of Dade County. The project fill will be obtained from an ocean borrow pit about 1.5 miles offshore in elevations of 36 to 50 feet. About 1.8 million cubic yards of sand will be dredged from an ocean borrow pit and placed along 0.85 mile of beach for restoration of protective and recreational assets. Adverse environmental effects include temporary turbidity and siltation in the borrow and fill areas during construction. Some marine life will be destroyed; however, these populations are expected to become reestablished. Consideration was given to several alternative plans but it was determined the proposed project would be the best and most desirable to preserve the beach on Bal Harbour. Comments on the proposed project were requested and subsequently received from various state, federal, and private agencies. (Mockler-Florida)
W73-08680

ROUGE RIVER FLOOD CONTROL PROJECT. SECTION B FROM I-94 TO MICHIGAN AVENUE ALTERNATIVE NO. IV (SUPPLEMENT TO FINAL ENVIRONMENTAL IMPACT STATEMENT).
For primary bibliographic entry see Field 08A.
W73-08681

FLOOD CONTROL ON SAGINAW RIVER, MICHIGAN AND TRIBUTARIES; FLINT RIVER AT FLINT, SWARTZ, AND THREAD CREEKS (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Detroit, Mich.
For primary bibliographic entry see Field 08A.
W73-08682

AQUATIC PLANT CONTROL AND ERADICATION PROGRAM, STATE OF TEXAS (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Galveston, Tex.

Available from National Technical Information Service, U.S. Department of Commerce. May 30, 1972. 99 p, 1 plate.

Descriptors: *Texas, *Environmental effects, *Aquatic weed control, *Water hyacinth, Navigable waters, Flood control, Recreation, Public health, Water quality control, Fish, Weed control, 2-4-D, Alligatorweed, Toxins, Oxygen demand.
Identifiers: *Environmental Impact Statements.

The project will continue control and progressive eradication of water hyacinth and alligatorweed in the navigable waters of Texas in the combined interest of navigation, flood control, drainage, agriculture, fish and wildlife conservation, recreation, public health, and related purposes. The project will serve to improve water quality, reduce impediments to navigation and aid in disease-vector control. Adverse environmental effects include a temporary depletion of dissolved oxygen and the emergence of a noxious condition toxic to fish. The amine salt and butoxyethanol ester of 2,4-D used for control of water hyacinth are extremely toxic to many broadleaf plants. Alternatives to the project include alternate methods of spraying, mechanical control, restricting the supply of nutrients to the water, and conducting research to discover a biological control for water hyacinth. Comments on the proposed project were encouraged and received from various state and federal agencies. (Mockler-Florida)
W73-08683

EDWARDS UNDERGROUND RESERVOIR, GUADALUPE, SAN ANTONIO, AND NUECES RIVERS AND TRIBUTARIES, TEXAS (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Fort Worth, Tex.
For primary bibliographic entry see Field 08A.
W73-08684

SOUTH BRANCH, RAHWAY RIVER, NEW JERSEY, FLOOD CONTROL PROJECT, RAHWAY, NEW JERSEY (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, New York.
For primary bibliographic entry see Field 08A.
W73-08685

SANTA PAULA CREEK CHANNEL, VENTURA COUNTY, CALIFORNIA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Los Angeles, Calif.
For primary bibliographic entry see Field 08A.
W73-08686

PEYTON CREEK, TEXAS--FLOOD CONTROL (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Galveston, Tex.
For primary bibliographic entry see Field 08A.
W73-08688

FLOOD CONTROL PROJECT, THOMPSON'S CREEK, HOLLAND PATENT, NEW YORK (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, New York.
For primary bibliographic entry see Field 08A.
W73-08689

CAMP GROUND LAKE, SALT RIVER BASIN, KENTUCKY (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Louisville, Ky.
For primary bibliographic entry see Field 08A.
W73-08690

PERRY COUNTY DRAINAGE AND LEVEE DISTRICTS NOS. 1, 2, AND 3, MISSOURI (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, St. Louis, Mo.
For primary bibliographic entry see Field 08A.
W73-08691

PROPOSED NEW LOCK--PICKWICK LANDING DAM (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Tennessee Valley Authority, Chattanooga.
For primary bibliographic entry see Field 08C.
W73-08692

REPORT OF THE TEXAS WATER DEVELOPMENT BOARD FOR THE BIENNIUM SEPTEMBER 1, 1970 THROUGH AUGUST 31, 1972.
Texas Water Development Board, Austin.
For primary bibliographic entry see Field 06E.
W73-08732

HYDROGRAPH SIMULATION MODELS OF THE HILLSBOROUGH AND ALAFIA RIVERS, FLORIDA: A PRELIMINARY REPORT,
Geological Survey, Tampa, Fla.
J. F. Turner, Jr.
Geological Survey open-file report 72025, 1972. 107 p, 28 fig, 4 tab, 8 ref.

Descriptors: *Streamflow forecasting, *Mathematical models, *Rainfall-runoff relationships, *Florida, Hydrologic data, Mathematical studies, Equations, Flood control, Watershed management, Hydrographs, Computer programs, Input-output analysis.
Identifiers: *Hillsborough River (Fla), *Alafia River (Fla).

Mathematical (digital) models that simulate flood hydrographs from rainfall records have been developed for the following gaging stations in the Hillsborough and Alafia River basins of west-central Florida: Hillsborough River near Tampa, Alafia River at Lithia, and North Prong Alafia River near Keysville. These models, which were developed from historical streamflow and rainfall records, are based on rainfall-runoff and unit-hydrograph procedures involving an arbitrary separation of the flood hydrograph. Hillsborough and Alafia River flood discharges can be simulated with expected relative errors less than 30% and flood peaks with average relative errors less than 15%. Because of the inadequate rainfall network used in obtaining input data for the North Prong Alafia River model, simulated peaks are frequently in error by more than 40%, particularly for storms having highly variable areal rainfall distribution. The models serve not only as a basis for forecasting floods, but also for simulating hydrologic information needed in flood-plain mapping and delineating and evaluating alternative flood control and abatement plans. (Woodard-USGS)
W73-08733

DELINEATION OF INFORMATION REQUIREMENTS OF THE T.V.A. WITH RESPECT TO REMOTE SENSING DATA,
Tennessee Univ., Knoxville.
For primary bibliographic entry see Field 07B.
W73-08737

STREAM GAUGING INFORMATION, AUSTRALIA, SUPPLEMENT 1970.
Australian Water Resources Council, Canberra.
For primary bibliographic entry see Field 07C.
W73-08738

GEOLOGIC AND HYDROLOGIC MAPS FOR LAND-USE PLANNING IN THE CONNECTICUT VALLEY WITH EXAMPLES FROM THE FOLIO OF THE HARTFORD NORTH QUADRANGLE, CONNECTICUT,
Geological Survey, Washington, D.C.
F. Pessl, Jr., W. H. Langer, and R. B. Ryder.
Geological Survey Circular 674, 1972. 12 p, 2 fig, 21 ref.

Descriptors: *Water resources development, *Land development, *Mapping, *Hydrogeology, *Connecticut, Planning, Land use, Topography, Geology, Land management, Watershed management, Groundwater resources, Streamflow, Water quality, Urbanization, Water quality control.
Identifiers: *Connecticut Valley, *Hartford (Conn).

Decisions that affect land and water use require an understanding of the complex geologic and hydrologic systems that exist within the earth's crust. The U.S. Geological Survey's Connecticut Valley Urban Area Project is developing a flexible resource data base in the form of maps that present a single characteristic or a combination of related characteristics of the land surface, earth materials, or water resources at a common scale and in a simplified format. The maps are prepared by interpretation of existing geologic and hydrologic maps and data available from ongoing U.S. Geological Survey and State programs. Map subjects include unconsolidated materials, depth to bedrock, depth to water table, thickness and distribution of extensive clay deposits, resources of aggregate, slopes, availability of groundwater, flood-prone areas, and quality and quantity of surface water. (Woodard-USGS)
W73-08746

SUMMARIES OF STREAMFLOW RECORDS IN NORTH CAROLINA,
Geological Survey, Raleigh, N.C.
For primary bibliographic entry see Field 07C.
W73-08747

THE CALIFORNIA STATE WATER PROJECT SUMMARY: NINETEEN-SEVENTY-ONE.
California State Dept. of Water Resources, Sacramento.

Bulletin No 132-72, Appendix C, 1972. 31 p.

Descriptors: *Water resources development, *Project purposes, *California, *Reviews, Water utilization, Water supply, Irrigation, Recreation facilities, Flood control, Electric powerplants, Imported water, Rivers, Reservoirs, Costs, Programs, State governments, Hydraulic structures, Project planning.
Identifiers: *California State Water Project, Progress report, Summary report.

The California State Water Project is basically a massive redistribution system designed to help correct an inbalance of water resources. More than 70% of California's available water originates in the State's northern third, while approximately 77% of the demand comes from the southern two-thirds. The State Water Project takes the north's abundant water, much of which now flows unused from the Sacramento-San Joaquin Delta to the Pacific Ocean and delivers it to where it can be productive. For example, in the San Joaquin Valley--the world's top farm region with a $2-billion-a-year agricultural production--the Project provides water to open up a quarter-million barren acres to cultivation and also to give needed relief to another 125,000 acres now irrigated from wells tapping overdrawn groundwater reservoirs. The Project is also designed to supply water to other areas of the State, to control winter and springtime floods, to open dozens of new recreational areas, to save and enhance fisheries and wildlife habitats, and to produce--smog-free--hydroelectric power.

The various aspects of the project are summarized. (WoodardiUSGS)
W73-08749

STREAMFLOW FORMATION AND COMPUTATIONS (FORMIROVANIYE I RASCHETY RECHNOGO STOKA).
Ukrainskii Nauchno-Issledovatelskii Gidro-Meteorologicheskii Institut, Kiev (USSR).
For primary bibliographic entry see Field 02E.
W73-08880

ICE JAMS IN THE DANUBE DELTA AND SOME MEASURES TO PREVENT FLOODS CAUSED BY THEM (ZATORY L'DA V DEL'TE DUNAYA I NEKOTORYYE MEROPRIYATIYA PO PREDOTVRASHCHENIYU VYZYVAYEMYKH IMI NAVODNENIY),
Vsesoyuznyi Nauchno-Issledovateskii Institut Gidrotekhniki, Leningrad (USSR).
V. N. Karnovich, and V. I. Sinotin.
Meteorologiya i Gidrologiya, No 4, p 78-85, April 1972. 2 fig, 1 tab, 4 ref.

Descriptors: *Ice jams, *River, *Deltas, *Floods, *Flood control, Channel improvement, Channel morphology, Meteorology, Melting, Ice breakup, Navigation, Explosives.
Identifiers: *USSR, *Danube River, *Ice control, Icebreakers.

Severe ice jams are formed in lower reaches of the Danube once every 7-10 years and are responsible for destruction of dikes, flooding of populated areas, and curtailment of naviatigation. The average time of formation of ice jams is 8-10 hours. The thickness of ice accumulations in severe jams is 7-9 meters. The volume of ice may reach 15 km in length, and the height of ice piles on the banks, 2.5 meters. Ice jams formed in spring last 7-10 days. The cause of formation of ice jams on the Danube is examined in terms of channel morphology, climate, and the water and ice regimes of the river. Methods used to break up ice jams in the Danube delta are described, and recommendations are made for improving ice-jam control by icebreakers, explosives, and channel regulation. (Josefson-USGS)
W73-08886

A DESCRIPTION AND ANALYSIS OF COASTAL ZONE AND SHORELAND MANAGEMENT PROGRAMS IN THE UNITED STATES,
Michigan Univ., Ann Arbor. Sea Grant Program.
For primary bibliographic entry see Field 02L.
W73-08887

DRAINAGE AND FLOOD CONTROL BACKGROUND AND POLICY STUDY.
Nolte (George S.) and Associates, San Francisco, Calif.

San Diego County Comprehensive Planning Organization, San Diego, California, Summary report, May 1970. 20 p, 1 fig. HUD Calif P-294 (G).

Descriptors: *Urban drainage, *Drainage programs, *Flood control, *Computer models, *Regional analysis, Urbanization, Land use, Regional development, Optimum development plans, California, Systems analysis, Data collections, Data processing, Flood plain zoning, Flooding, Costs.
Identifiers: *San Diego County (Calif).

Flooding problems in San Diego County were studied and current practices for flood hazard prevention were inventoried. Although basically a water-short area, floods are becoming a serious problem primarily due to urban development of floodplain lands. The growth of the County is expected to raise the population from the current 1,400,000 to about 2,000,000 by 1990, causing further problems. Over 100 agencies are involved in flood control and storm drainage in the County and over 200 documents were reviewed in this study. Detailed solutions were not offered; rather, a general direction is indicated along with a supply of data on which to base action. Flood control should be placed in the authority of a regional agency on the basis of natural rather than political boundaries. Land use zoning was viewed as a major factor in the prevention of damage from floods. This report, which is a summary of two volumes on flood control and storm drainage, includes a section on definitions of terms for the non-technical reader. This helps bring about community understanding of the problems involved, and citizen cooperation with remedial programs. (Poertner)
W73-08891

STORM DRAINAGE.
Baruth and Yoder, Walnut Creek, Calif.

Available from the National Technical Information Service as PB-211 048, $11.25 in paper copy, $1.45 in microfiche. Mid-Humboldt County Urban Planning Program, Eureka, California, April 1971. 129 p, 22 fig, 21 tab. LPO-P/360-CAS-1.

Descriptors: *Urban drainage, *Drainage systems, *Flood control, *Facilities, *Storm drains, Storm runoff, Flood plain zoning, Costs, Urban runoff, Detention reservoirs, Drainage programs, Drainage districts, Urbanization, Forecasting, Drainage water, Drainage practices, Drainage engineering, Storm water, California.
Identifiers: *Mid-Humboldt County (California).

Problems of storm drainage in mid-Humboldt County, California were studied to determine methods of solution by 2020. The population of the area is expected to grow from the 1970 level of 74,000 to 325,000 by 2020. Concurrently, residential land use is expected to almost triple, commercial acreage will rise to 2 1/2 times its present extent, and industrial land use will more than double. As a consequence, drainage facilities will be required to handle loads considerably larger than existing loads. A detailed master plan for storm drainage is given, covering recommended improvements involving pipes, detention ponds and open channels. Design data are included as is the cost and construction period recommended. A total cost of $32 million was estimated for all construction plus a 30 percent allowance for contingencies, engineering and financing. Financing methods includes general obligation bonds, special assessments, and grants from federal sources. Besides adoption of the master plan, the County should adopt an effective flood plain zoning ordinance to limit development in all flood plains of the study area. (Poertner)
W73-08892

DRAINAGE SYSTEM ALTERNATIVES,
R. K. Brown.
Paper presented at the American Public Works Association Congress and Equipment Show, Minneapolis, Minnesota, September 21-27, 1972. 9 p.

Descriptors: *Urban drainage, *Flooding, *Drainage systems, *Drainage practices, *Drainage programs, Water pollution, Combined sewers, Detention reservoirs, Erosion, Urbanization, Urban runoff, Storm runoff, Canada.
Identifiers: *Ontario (Canada).

Urban development usually has a detrimental effect on natural drainage systems requiring the development of suitable added drainage facilities. Problems of urban drainage include flooding, pollution and erosion and each system studied must include a study of how that system copes with these problems as well as problems of costs, aesthetics, land availability and time needed for implementation. Urban drainage systems are commonly of four types: (1) natural drainage courses, such as rivers which are often over-loaded or polluted from urban drainage; (2) open channels that are natural channels which have been altered by straightening, widening, or deepened to handle the increased urban flow and which can be used in an open space program; (3) trunk storm sewers, which can be very expensive and of limited capacity, needing a means to handle excess flow; and (4) local storm drains, which can be complex, costly and beset by problems of flooding or pollution. Design criteria for drainage facilities are based on the rational formula for runoff rates, but storage of water in ponds and tanks can significantly reduce this rate. Detention ponds for stormwater storage can be incorporated into parks. Proper consideration of all effects of drainage in urban areas is necessary to provide adequate service to the citizens. (Poertner)
W73-08897

LAND DEVELOPMENT AND HEAVY METAL DISTRIBUTION IN THE FLORIDA EVERGLADES,
Florida State Univ., Tallahassee, Dept. of Oceanography.
For primary bibliographic entry see Field 05B.
W73-08906

MALIBU MASTER PLAN OF STORM DRAINS.
Los Angeles County Engineer Dept., Calif.
For primary bibliographic entry see Field 05G.
W73-08980

INITIAL WATER, SEWERAGE AND FLOOD CONTROL PLAN REPORT, JOB 4800.
Duncan and Jones, Berkeley, Calif.
For primary bibliographic entry see Field 06B.
W73-08981

LAND USE AND DEVELOPMENT ALONG THE TENNESSEE RIVER IN THE TARCOG REGION.
Top of Alabama Regional Council of Governments, Huntsville.
For primary bibliographic entry see Field 06B.
W73-08988

INFLUENCE OF REGULATION OF THE LACZANKA RIVER ON THE OCCURRENCE OF HIRUDINEA,
Bialystok Medical Academy (Poland). Dept. of Histology and Embryology.
J. Wilkialis.
Pol Arch Hydrobiol. Vol 18 No 4, p 359-365. 1971 Illus.
Identifiers: Birds, *Hirudinea, Laczanka River, Macrophytes, Mammals, *Poland, *Regulation, Rivers.

As a result of changes of the environment following the regulation of the Laczanka River a decrease in the number of species and of individuals of Hirudinea was observed in the regulated areas. At the regulated stations, the eurytopic species occurred in great numbers, but the rare species which need almost stagnant environments and the presence of prey from the surrounding environments (water birds, mammals) were observed sporadically or not at all. Changes in the number at particular stations of the regulated areas were influenced by both periodical cleaning of the regulated areas and the fall in water level during dry periods. It is believed that the factors favorable for more rapid recolonization of the regulated stations in the river by Hirudinea are accumulation of mud sediments and detritus, the presence of favorable places for attachment, the reappearance of macrophytes and availability of suitable food.--Copyright 1972, Biological Abstracts, Inc.
W73-09019

MATHEMATICAL SIMULATION OF THE TURBIDITY STRUCTURE WITHIN AN IMPOUNDMENT,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 05G.
W73-09081

FLOODS IN THE IOWA RIVER BASIN UPSTREAM FROM CORALVILLE LAKE, IOWA,
Geological Survey, Iowa City, Iowa.
For primary bibliographic entry see Field 07C.
W73-09084

DEVELOPMENT OF A DISCHARGE MEASUREMENT DEVICE FOR SEWER FLOW,
Illinois Univ., Urbana. Dept. of Civil Engineering.
For primary bibliographic entry see Field 07B.
W73-09085

4B. Groundwater Management

AN ANALYTICAL INTERDISCIPLINARY EVALUATION OF THE UTILIZATION OF THE WATER RESOURCES OF THE RIO GRANDE IN NEW MEXICO,
New Mexico State Univ., University Park. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 06B.
W73-08458

MAP SHOWING GENERAL AVAILABILITY OF GROUND WATER IN THE SALINA QUADRANGLE, UTAH,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W73-08473

RADIOCHEMICAL MONITORING OF WATER AFTER THE CANNIKIN EVENT, AMCHITKA ISLAND, ALASKA, JULY 1972,
Geological Survey, Lakewood, Colo.
For primary bibliographic entry see Field 05B.
W73-08479

GROUNDWATER DEVELOPMENT AND ITS INFLUENCE ON THE WATER BALANCE,
Technical Univ., of Denmark, Copenhagen.
For primary bibliographic entry see Field 02F.
W73-08507

THE MANAGEMENT OF GROUNDWATER RESOURCE SYSTEMS,
California Univ., Santa Barbara. Dept. of Mechanical Engineering.
For primary bibliographic entry see Field 05G.
W73-08660

LIMESTONE POLICY.
Illinois State Environmental Protection Agency, Springfield. Div. of Public Water Supplies.
For primary bibliographic entry see Field 05G.
W73-08672

HYDROLOGY OF THE UPPERMOST CRETACEOUS AND THE LOWERMOST PALEOCENE ROCKS IN THE HILIGHT OIL FIELD, CAMPBELL COUNTY, WYOMING,
Geological Survey, Washington, D.C.
M. E. Lowry.
Geological Survey open-file report, February 1973. 60 p, 13 fig, 5 plate, 1 tab, 18 ref.

Descriptors: *Groundwater resources, *Geology, *Aquifer characteristics, *Water wells, *Wyoming, Oil fields, Groundwater movement, Hydrogeology, Water yield, Pumping, Drawdown, Hydrologic data, Sandstones, Geologic mapping, Geologic formations.
Identifiers: *Campbell County (Wyo), Hilight oil field (Wyo).

There was a comparatively large increase in the development of groundwater from the Fox Hills Sandstone of Cretaceous age and some of the overlying aquifers in the Powder River basin in 1970-71 for secondary recovery of oil, principally in Campbell County, Wyoming. Recharge to the Lance-Fox Hills aquifer in the Hilight oil field is largely by vertical movement; there is no recharge from the Lance and Fox Hills outcrops on the east side of the basin to the formations in the Hilight area. At the end of the central Hilight water-flood project, the maximum possible drawdown resulting from the pumping of any one well at a distance of 10 miles from the pumped well would be about 15 feet, if the projected pumping were evenly distributed among the project wells. Within a few years after pumping has ceased, water in the project wells will approach the levels present before pumping began. The only irreversible effect of pumping will be the compaction of shale, with attendant subsidence, because the water derived from the shale probably will not be replaced. (Woodard-USGS)
W73-08725

REPORT OF THE TEXAS WATER DEVELOPMENT BOARD FOR THE BIENNIUM SEPTEMBER 1, 1970 THROUGH AUGUST 31, 1972.
Texas Water Development Board, Austin.
For primary bibliographic entry see Field 06E.
W73-08732

GROUNDWATER RESOURCES OF WASHINGTON COUNTY, TEXAS,
Geological Survey, Austin, Tex.
W. M. Sandeen.
Texas Water Development Board, Austin, Report 162, November 1972. 105 p, 21 fig, 9 tab, 52 ref.

Descriptors: *Groundwater resources, *Hydrologic data, *Water wells, *Aquifers, *Texas, Water resources development, Aquifer characteristics, Data collections, Pumping, Water yield, Water utilization, Water quality, Chemical analysis, Groundwater movement, Groundwater recharge, Water level fluctuations, Hydrographs, Hydrogeology.
Identifiers: *Washington County (Tex).

Large quantities of undeveloped fresh water, extending to depths of 1,200 feet below sea level occur in the Catahoula Sandstone, Jaspar aquifer, Evangeline aquifer, and the alluvium of the Brazos River in Texas. In 1968, an estimated 3.2 mgd was pumped from the groundwater reservoir. At lease 8,500 acre-feet per year of fresh groundwater is being transmitted through the Catahoula Sandstone, the Jaspar aquifer, and the Evangeline aquifer, and about 18,700 acre-feet per year of fresh groundwater is being rejected from the outcrops of these units. About 30,700 acre-feet per year of fresh groundwater probably could be withdrawn continuously from the aquifers. About 118,000 acre-feet per year is available for development from the alluvium of the Brazos River. The chemical quality of the groundwater is suitable for most types of uses or can be made suitable with a minimum of treatment. Less than 10 percent of the samples analyzed for dissolved solids contained more than 1,000 mg/liter. In general, the water is very hard (more than 180 mg/liter of hardness) and is slightly alkaline. (Woodard-USGS)
W73-08739

GROUNDWATER RESOURCES OF NAVARRO COUNTY, TEXAS,
Geological Survey, Austin, Tex.
G. L. Thompson.
Available from Texas Water Development Board P.O. Box 13087, Austin, Tex 78711. Texas Water Development Board Report 160, November 1972. 63 p, 12 fig, 8 tab, 47 ref.

Descriptors: *Groundwater resources, *Hydrologic data, *Water wells, *Aquifers, *Texas, Water resources development, Aquifer characteristics, Data collections, Withdrawal, Water yield, Water utilization, Groundwater movement, Groundwater recharge, Precipitation (Atmospheric), Water quality, Chemical analysis, Water levels, Hydrogeology, Hydrographs.
Identifiers: *Navarro County (Tex).

Navarro County, an area of 1,084 square miles, is in the central part of northeastern Texas. About 1.3 mgd of groundwater used in 1968 included public supply, 0.15 mgd; rural domestic, 0.40 mgd; livestock, 0.23 mgd; industry, 0.002 mgd; and irrigation, 0.50 mgd. Most of the water required for public supply and industrial use was supplied by surface water obtained from Navarro Mills and other reservoirs. The principal aquifers and minor water-bearing formations and their approximate quantities of water supplied in 1968 were Woodbine Formation, 0.13 mgd; Nacatoch Sand, 0.05 mgd; Wilcox, Midway, and Navarro Groups (excluding Nacatoch Sand), and Taylor Marl, 0.60 mgd; and alluvial deposits, 0.50 mgd. The Hosston Formation, which is untapped by wells in Navarro County, is potentially a valuable source of groundwater in the western part of the county. Of the samples in which approximate dissolved solids were calculated from specific conductance plus the laboratory determinations of dissolved solids, 61% of all water samples exceeded 500 mg/liter but only 35% exceeded 1,000 mg/liter. (Woodard/USGS)
W73-08740

GROUND-WATER RESOURCES OF HARDEMAN COUNTY, TEXAS,
Geological Survey, Austin, Tex.
M. L. Maderak.
Texas Water Development Board Report 161, November 1972. 44 p, 10 fig, 6 tab, 17 ref.

Descriptors: *Groundwater resources, *Water quality, *Water wells, *Hydrologic data, *Texas, Aquifers, Aquifer characteristics, Water yield, Water level fluctuations, Groundwater movement, Groundwater recharge, Water utilization, Irrigation, Pumping, Hydrogeology, Hydrographs, Maps.
Identifiers: *Hardeman County (Tex).

The Blaine Formation of Permian age and the alluvial terrace deposits of Quaternary age are the most important sources of large quantities of groundwater in Hardeman County, Texas. The quantity of water moving through the alluvium in the vicinity of Chillicothe is estimated at 2,600 acre-feet per year, which is equivalent to about 1 inch or 5% of the average precipitation. Recharge to the Blaine Formation is estimated to be about 17,000 acre-feet per year. Water levels in most wells in the Blaine Formation during the period 1953-69 showed a net decline of 10 to 20 feet; water levels in wells in the alluvium near Chillicothe during the period 1960-69 had an average decline of 3.6 feet, or less than 0.5 foot per year. Withdrawal of groundwater for municipal and domestic supply, livestock use, industrial use, and irrigation is estimated at 11,500 acre-feet in 1968. Water from the alluvium is very hard, but generally has a dissolved-solids content less than 1,000 milligrams per liter. Water from Blaine Formation is more mineralized but has been used successfully for irrigation for many years. (Woodard-USGS)
W73-08741

WATER-LEVEL RECORDS, 1969-73, AND HYDROGEOLOGIC DATA FOR THE NORTHERN HIGH PLAINS OF COLORADO,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W73-08745

GEOLOGIC AND HYDROLOGIC MAPS FOR LAND-USE PLANNING IN THE CONNECTICUT VALLEY WITH EXAMPLES FROM THE FOLIO OF THE HARTFORD NORTH QUADRANGLE, CONNECTICUT,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 04A.
W73-08746

SALINE GROUNDWATER RESOURCES OF MISSISSIPPI,
Geological Survey, Jackson, Miss.
For primary bibliographic entry see Field 07C.
W73-08750

DATA REQUIREMENTS FOR MODELING A GROUND-WATER SYSTEM IN AN ARID REGION,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 02F.
W73-09078

4C. Effects on Water of Man's Non-Water Activities

THE SNOW REMOVAL CONTROVERSY,
Toronto Univ. (Ontario). Inst. of Environmental Sciences and Engineering.
For primary bibliographic entry see Field 05B.
W73-08601

DRAINAGE AND FLOOD CONTROL BACKGROUND AND POLICY STUDY.
Nolte (George S.) and Associates, San Francisco, Calif.
For primary bibliographic entry see Field 04A.
W73-08891

STORM DRAINAGE.
Baruth and Yoder, Walnut Creek, Calif.
For primary bibliographic entry see Field 04A.
W73-08892

IMPACT OF HIGHWAYS ON SURFACE WATERWAYS,
Metropolitan Sanitary District of Greater Chicago, Ill.
R. F. Lanyon.
July 14, 1972. 21 p, 3 fig, 1 tab, 9 ref.

Descriptors: *Storm runoff, *Highways, *Detention reservoirs, *Storage, *Highway effects, Water pollution control, Sediment control, Flood control, Flood plains, Water pollution sources, Water pollution, Storm water, Construction, Drainage systems, Drainage effects.

The modern highway has a high efficiency of stormwater drainage which is beneficial to the highway, but detrimental to the waterways into which the runoff is discharged. The associated landscaping near the highway often reduces the natural storage of rainwater and reduces the rate of rainwater infiltration, causing additional problems of increased flow in the waterways. Further problems are encountered when highways are built in floodplains, occupying land which previously was used for stormwater storage. During construction of the roadway, erosion can be a serious problem. Sediment yields have been estimated at 500 to 1,000 tons per year per mile of 100-foot wide construction, or 40 to 80 tons per acre per year. Sediment yields between 0.3 to 0.5 tons per acre per year are cited for undeveloped land. The construction of a roadway across a stream can be a potential flood hazard if debris is allowed to collect at the bridge. Highways can also be detrimental to waterways as a result of pollution from deicing chemicals, oil on the pavement and ordinary surface dirt. Detention storage of stormwater runoff is recommended as a means of controlling many of these problems. Runoff flow rates can be reduced, sediments settled out and additional flood plain storage provided. Detention storage can provide other important benefits such as groundwater replenishment, and recreational and open space facilities. Detention of runoff can also reduce the cost of drainage facilities in comparison to conventional facilities. (Poertner)
W73-08894

TREATMENT OF URBAN RUNOFF.,
Environmental Protection Agency, Washington, D.C. Municipal Pollution Control Section.
For primary bibliographic entry see Field 05G.
W73-08898

PROJECT WAGON WHEEL TECHNICAL STUDIES REPORT NO. 2.
El Paso Natural Gas Co., Tex.
For primary bibliographic entry see Field 05B.
W73-08991

INADVERTENT WEATHER AND PRECIPITATION MODIFICATION BY URBANIZATION,
Illinois State Water Survey, Urbana. Atmospheric Science Section.
S. A. Changnon, Jr.
ASCE Proceedings, Journal of the Irrigation and Drainage Division, Vol 99, No IR1, Paper 9608, p 27-41, March 1973. 14 fig, 2 tab, 10 ref. NSF GA-18781 and GA-28189X.

Descriptors: *Urbanization, *Weather modification, *Precipitation (Atmospheric), Urban hydrology, Rainfall, Cities, Weather, Climates, Air pollution effects, Storms, Runoff.

Urban-industrial complexes produce measurable modification of all weather conditions. Particularly significant are increases in the precipitation conditions of interest to hydrologists and urban planners. In and immediately downwind of major urban areas, the annual precipitation may be increased from 5%-30%, the annual thunderstorm frequency is increased 15%-30%, the heavy daily rainstorm frequencies are increased by 20%-40%. Increases in local runoff may be from 15%-20%. Local crop yields may be increased 2%-10% by this rain modification. (Knapp-USGS)
W73-09077

ROLE OF WATER IN URBAN PLANNING AND MANAGEMENT,
Geological Survey, Arlington, Va. Water Resources Div.
W. J. Schneider, D. A. Rickert, and A. M. Spieker.
Geological Survey Circular 601-H, 1973. 10 p, 2 fig, 1 plate, 1 tab.

Descriptors: *Urbanization, *Urban hydrology, *Hydrologic data, *Data collections, *Planning, Data processing, Rainfall-runoff relationships, Water quality, Water management (Applied), City planning, Land use, Storm drains.
Identifiers: Urban management.

The concentration of people in urban areas has modified the natural landscape, bringing about water problems. Although water resources in urban areas are altered by urbanization, the deleterious effects can be minimized or corrected by comprehensive planning and management. Water-resource information for urban planning is badly needed, but urban planners are not generally able to identify the data that are needed. To help satisfy this need, a water-resources evaluation matrix was developed. The graphic matrix provides a means for organizing the relative importance of water-related problems, and for identifying the data needed to evaluate these problems for the purpose of urban planning. The matrix lists nine subject categories in which water-related urban problems may occur. The matrix also lists 51 possible data inputs for evaluation of the problem areas. The inputs include the standard types of basic hydrologic data as well as information based on interpretation and analysis of these data. The list also includes the factors of climate, land, and culture. The matrix aids in the development of resource evaluation in two ways: first, by promoting interdisciplinary discussion, it leads to a mutual understanding of the water-related problems; second, it serves as a checklist for determining the data needs for evaluation of each problem. (Knapp-USGS)
W73-09082

4D. Watershed Protection

STATEMENT OF FINDINGS--BAL HARBOUR, FLORIDA, PARTIAL BEACH RESTORATION, BEACH EROSION CONTROL AND HURRICANE PROTECTION PROJECT, DADE COUNTY, FLORIDA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Jacksonville, Fla.
For primary bibliographic entry see Field 04A.
W73-08680

OLIVER BOTTOMS RESOURCE CONSERVATION AND DEVELOPMENT PROJECT, SEBASTIAN COUNTY, ARKANSAS (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Soil Conservation Service, Washington, D.C.

Available from National Technical Information Service, U.S. Dep't. of Commerce as EIS-AR-72-5373-F. Price: $3.00 in paper copy, $1.45 in microfiche. September 10, 1972. 16 p.

Descriptors: *Arkansas, *Environmental effects, *Channel improvement, *Erosion control, Wildlife habitats, Water pollution, Water quality control, Flood protection, Flood plain zoning, Watershed management, Land use, Excavation, Vegetation establishment, Bank protection, Bank stabilization, Planting management, Revegetation, Stream erosion, Vegetation effects.
Identifiers: *Environmental Impact Statements, *Oliver Bottoms (Ark).

This watershed project consists of the installation of about 1.4 miles of channel improvement and a purtenant pipe overfall structures for grade stabilization and erosion control in the Oliver Bottoms Watershed, Sebastian County, Arkansas. Excavation of the channel from one side only and plantings of adapted grasses, trees and shrubs to minimize erosion are also planned to provide food and cover for wildlife. Adverse environmental effects include the loss of some productive land resources as a result of widening the channel, removal of some desirable trees to permit construction of the channel, and a minor amount of water pollution during the installation of the project. Floodwater retarding structure sites were considered, several channel locations were also considered, and a third alternative was no action. Other desirable effects include enhanced wildlife food and cover, elimination of stagnant water and mosquito breeding areas, and a reduction in floodwater damage to crops, roads, and land resources. (Mockler-Florida)
W73-08687

PEYTON CREEK, TEXAS--FLOOD CONTROL (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Galveston, Tex.
For primary bibliographic entry see Field 08A.
W73-08688

05. WATER QUALITY MANAGEMENT AND PROTECTION

5A. Identification of Pollutants

DEVELOPMENT AND TESTING OF A DOUBLE-BEAM ABSORPTION SPECTROGRAPH FOR THE SIMULTANEOUS DETERMINATION OF DIFFERENT CATIONS IN WATER,
Kentucky Water Resources Inst., Lexington.
For primary bibliographic entry see Field 02K.
W73-08469

DETERMINATION OF TRACE ELEMENTS IN WATER UTILIZING ATOMIC ABSORPTION SPECTROSCOPY MEASUREMENT,
Kentucky Water Resources Inst., Lexington.
G. D. Christian.
Available from the National Technical Information Service as PB-220 122, $3.75 in paper copy, $1.45 in microfiche. Research Report No 58, 1972. 30 p, 7 tab, 10 ref. OWRR A-033-KY (1), 14-31-0001-3217.

Descriptors: *Spectrophotometry, *Instrumentation, *Chemical analysis, Water analysis, Laboratory tests, Analytical techniques, Spectrometers, Pollutant identification, *Metals, *Trace elements.
Identifiers: *Atomic absorption spectrophotometry.

Flameless atomic absorption methods were investigated for determination of trace elements in water. Metals were preconcentrated by electrodeposition on a wire. The metals were then atomized for atomic absorption measurement by resistive heating of the wire. As little as 0.01 part per million of mercury could be determined in this way. In a cold vapor cell, the sample is treated with a reducing agent to reduce mercury to the elemental state. Argon is bubbled through the sample to carry mercury vapor into a quartz-ended tube where its atomic absorption is measured. As little as 0.5 part per billion of mercury was determined in natural waters. A heated tube atomizer was designed for the determination of relatively volatile elements such as arsenic. Arsenic sublimes at 613 deg C and results in a significant absorbance at 1937A, probably as As4. Ten micrograms of arsenic could be detected. A simple and inexpensive tantalum ribbon flameless atomizer cell in which a few microliters of sample were dried and atomized on a tantalum ribbon heated resistively was also tested. (Knapp-USGS)
W73-08470

SOME CHARACTERISTICS OF FLUORESCENT PSEUDOMONADS ISOLATED FROM SURFACE WATERS AND CAPABLE OF GROWTH AT 41 C,
Georgia Inst. of Tech., Atlanta. School of Civil Engineering.
A. W. Hoadley, and G. Ajello.
Canadian Journal of Microbiology, Vol 18, No 11, p 1769-1773, November 1972. 3 tab, 12 ref.

Descriptors: *Aquatic bacteria, *Surface waters, *Biological properties, *Pollutant identification, Pathogenic bacteria, Aerobic bacteria, Isolation, Temperature, Pigments.
Identifiers: *Fluorescent pseudomonads, *Biochemical characteristics, Pseudomonas aeruginosa, Pseudomonas fluorescens, Pseudomonas putida, Culture media, Biochemical tests, Bacterial physiology.

Studies were conducted to establish (1) whether the apyocyanogenic fluorescent pseudomonads capable of growth at 41 C were distinguishable from P. aeruginosa, (2) the extent to which they occurred in surface waters, and (3) their potential as pathogens. Surface water samples enriched in organic matter were obtained from several recreational lakes in North Georgia. The most probable number test was performed to determine the fluorescent pseudomonads capable of growth at 39 C. Twenty-nine apyocyanogenic strains of fluorescent pseudomonads capable of growth at 39C were isolated for use in comparative studies with a typical pyocyanogenic strain of P. aeruginosa. Among the 29 isolates subjected to selected tests, some strains were clearly distinguishable from P. aeruginosa while others possessed characteristics in common with both P. aeruginosa and certain non-fluorescent aerobic pseudomonads. The pathogenicity to mice of representative strains injected intraperitoneally varied within a range reported in the literature for P. aeruginosa, but differed by at least one order of magnitude from that of a control strain of P. aeruginosa examined. (Holoman-Battelle)
W73-08530

ENVIRONMENTAL FACTORS CORRELATED WITH SIZE OF BACTERIAL POPULATIONS IN A POLLUTED STREAM,
New Mexico Highlands Univ., Las Vegas. Dept. of Biology.
H. Brasfeild.
Applied Microbiology, Vol 24, No 3, p 349-352, September 1972. 2 tab, 14 fig.

Descriptors: Water analysis, Population, *Bioindicators, Water quality, *Streptococcus, *Regression analysis, *Correlation analysis, Data processing, *Coliforms, Water temperature, Hydrogen ion concentration, Detergents, Nitrates, Nitrites, Sulfates, Chlorides, Phosphates, Bicarbonates, *Pollutant identification, Streams, Water pollution effects, Enteric bacteria, *New Mexico.
Identifiers: *Gallinas River.

Samples of water were taken from a polluted zone of the Gallinas River and analyzed as to numbers of total bacteria, coliforms, and fecal streptococci. Environmental factors measured were temperature, pH and concentrations of detergent, nitrate plus nitrite nitrogen, sulfate, chloride, bicarbonate, and phosphate. Thirty-two observations were made from 12 March through 22 July 1971. Stepwise multiple linear regression analyses of the data were carried out by computer to determine which of the environmental factors were significantly correlated with numbers of bacteria present. A multiple linear regression equation was constructed for each bacteriological parameter as a function of significant variables only. Log total bacteria was correlated positively with bicarbonate, phosphate, and detergent concentrations. Log coliforms was correlated positively with phosphate and sulfate concentrations and negatively with chloride concentration. Log fecal streptococci was correlated positively with bicarbonate and chloride concentration. (Little-Battelle)
W73-08532

THE ISOLATION AND ENUMERATION OF CYTOPHAGAS,
Alberta Univ., Edmonton. Dept. of Soil Science.
P. J. Christensen, and F. D. Cook.
Canadian Journal of Microbiology, Vol 18, No 12, p 1933-1940, December 1972. 1 fig, 9 tab, 22 ref.

Descriptors: *Aquatic bacteria, *Isolation, *Pollutant identification, Detergents, Surfactants, Bactericides, Inhibition.
Identifiers: *Cytophagas, Enumeration, Tween 20, Sodium lauryl sulfate, Culture media, Selective media, Growth.

A comparison of 20 media based on degraded milk, protein or tryptone, yeast extract, and sodium acetate showed that various new formulae were superior to standard media for enumeration of cytophagas from aquatic habitats, for their isolation, and for maximum expression of the spreading characteristic. The use of 0.1 microliter/liter Tween 20 in dilution blanks increased counts of cytophagas up to threefold, but incorporation of Tween 20 into the plating agar had no significant effect on the numbers recovered. Sodium lauryl sulfate (S.L.S.) was examined as a possible screening agent for identification of cytophagas. A concentration of 0.1 percent S.L.S. inhibited the growth of 97 percent of the 66 cytophagas tested, but more than 80 percent of the other 41 organisms tested were also affected. However, 91 percent of the cytophagas were sensitive to S.L.S. and showed proteolysis on skim acetate medium compared to 53 percent of the Flavobacteria and 50 percent of the other organisms tested. None of the third group of organisms could be confused morphologically with the cytophaga group; thus it is suggested that S.L.S. susceptibility performed on skim acetate medium could be a useful screening test for cytophagas. (Holoman-Battelle)
W73-08533

IDENTIFICATION OF VIBRIO CHOLERAE BY PYROLYSIS GAS-LIQUID CHROMATOGRAPHY,
Manchester Univ. (England). Dept. of Bacteriology and Virology.
J. M. Haddadin, R. M. Stirland, N. W. Preston, and P. Collard.
Applied Microbiology, Vol 25, No 1, p 40-43, January 1973. 2 fig, 1 tab, 6 ref.

Descriptors: *Pollutant identification, *Pathogenic bacteria, *Aerobic bacteria, *Chemical analysis, E. coli, Salmonella, Shigella, Varieties.
Identifiers: *Pyrolysis gas liquid chromatography, *Vibrio cholerae, Sample preparation, Aeromonas, Biochemical tests, Proteus, Pseudomonas aeruginosa, Vibrio parahaemolyticus, Vibrio proteus.

Fifty-seven strains of chloera-like vibrios obtained from a variety of sources were grown individually at 37C for 20 hr in a 50-ml static culture of nutrient broth. Formalin was added; the bacteria were harvested by centrifugation, washed three times, and resuspended in distilled water. Samples loaded onto the coil filament of the gas chromatograph were pyrolyzed at 800C for 5 sec. Conventional biochemical tests were also performed to differentiate the biotypes of V. cholerae. Those cholera-like vibrios examined by pyrolysis gas-liquid chromatography could be distinguished from other common aerobic gram-negative bacilli, including oxidase-positive organisms, e.g., Aeromonas. Vibrios in Heiberg group I were subdivided into three types on the basis of differences in one complex in the chromatogram, and these closely corresponded with the identification as classical, El Tor, or 'intermediate' biotypes of Vibrio cholerae by conventional methods. (Holoman-Battelle)
W73-08534

A REAPPRAISAL: CORRELATION TECHNIQUES APPLIED TO GAS CHROMATOGRAPHY,
Warren Spring Lab., Stevenage (England). Control Engineering Div.
G. C. Moss, and K. R. Godfrey.
Instrumentation Technology, Vol 20, No 2, p 33-35, February 1973. 3 fig, 7 ref.

Descriptors: *Gas chromatography, *Pollutants, Pollutant identification, Methodology.
Identifiers: *Correlation techniques, *Trace levels, Detection limits.

The case for applying correlation techniques to gas chromatography has been reexamined following the introduction of on-line cross-correlators. Although there is still little need for these techniques in many chromatographic analyses, a

series of experiments were designed that demonstrate the feasibility of applying cross-correlation to trace gas analysis. The experiments show that correlation offers considerable advantages over the single-sample injection method when minute quantities of a component in a sample gas are being measured. There appears to be much scope for the application of correlation techniques to pollution measurement. (Holoman-Battelle)
W73-08535

EDWARDSIELLA TARDA, A NEW PATHOGEN OF CHANNEL CATFISH (ICTALURUS PUNCTATUS),
Bureau of Sport Fisheries and Wildlife, Stuttgart, Ark. Warmwater Fish Cultural Labs.
F. P. Meyer, and G. L. Bullock.
Applied Microbiology, Vol 25, No 1, p 155-156, January 1973. 3 ref.

Descriptors: *Pathogenic bacteria, *Channel catfish, *Epizootiology, *Enteric bacteria, Fish diseases, Freshwater fish, Fish parasites, Water pollution effects, Toxicity, Coliforms.
Identifiers: *Edwardsiella tarda, *Ictalurus punctatus.

Edwardsiella tarda, an enteric, gram-negative bacterium, causes gas-filled, malodorous lesions in muscle tissue of channel catfish. Incidence and epizootiology of the disease are presented. (Holoman-Battelle)
W73-08536

DEPLETED URANIUM AS CATALYST FOR HYDROCRACKING SHALE OIL,
Bureau of Mines, Laramie, Wyo. Laramie Energy Research Center.
P. L. Cottingham, and L. K. Barker.
Industrial and Engineering Chemistry. Product Research and Development, Vol 12, No 1, p 41-47, March 1973. 11 fig, 1 tab, 11 ref.

Descriptors: Oil, Oil wastes.
Identifiers: *Uranium oxide, *Catalysts, *Gasoline, *Hydrocracking, *Shale oil, Desulfurization, Aromatic hydrocarbons.

Depleted uranium oxide, deposited by the impregnation method on activated alumina and on commercial cobalt molybdate catalyst, was evaluated for catalytic use in hydrocracking crude shale oil at 3000 psig with temperatures from 807 degrees to 1010 degrees F. Adding 10 percent uranium oxide to the catalysts significantly increased the conversion of heavy shale oil to lighter products during hydrocracking. Gasoline produced at the higher conversion levels with the uranium-promoted catalysts were richer in aromatics and had higher octane numbers than those produced with the unpromoted catalysts. Adding uranium to alumina substantially improved the desulfurization activity, but adding uranium to cobalt molybdate did not significantly affect the already high desulfurization activity of this catalyst. (Little-Battelle)
W73-08537

AN APPLICATION OF MULTIVARIATE ANALYSIS TO COMPLEX SAMPLE SURVEY DATA,
North Carolina Univ., Chapel Hill. Dept. of Biostatistics.
For primary bibliographic entry see Field 07B.
W73-08538

PHOTOGRAPHING FUNGI,
Camera M.D. Studios, Inc.
C. M. Weiss.
Industrial Photography, Vol 21, No 11, p 20, 21, 43-45, November 1972.

Descriptors: Methodology, *Pathogenic fungi, *Pollutant identification, *Laboratory equipment, Systematics, Plant morphology, Lighting, Cameras, Color, Films, Cultures.
Identifiers: *Photomicrography, *Photomacrography, Speciation, Color photography, Microsporum canis, Keratinomyces ajelloi, Trichophyton soudanense, Tricophyton gallinae, Microsporum audounii.

Techniques for photographing fungi for species identification include (1) photomacrography used to record gross morphology of fungal cultures, and (2) photomicrography used to record the microscopic morphology of the fungus specimens. Petri dishes (glass or plastic, non-opaque, with shallow sides to minimize shadows) should be used for those cultures to be photographed because they present less difficult problems of lighting, diffraction, and focus than other containers. Badly scratched agar will produce light flare and distortion during photography. Portable equipment can be used but stationary apparatus was used. The equipment consisted of a Polaroid MP-3 camera with 75-, 127-, and 35-mm photomacrography lenses. By using such a fixed setup, those plates requiring serial photography during several weeks of culture growth will not have equipment or photographic variables introduced. Lighting is perhaps the most important photographic requirement and directional lighting is suggested. Since color is a major factor in species identification, several color films were tested for use under controlled photographic conditions and those that work best are listed. (Holoman-Battelle)
W73-08539

NONDESTRUCTIVE INSTRUMENTAL MONITORING OF FUEL OIL FOR VANADIUM, SODIUM, AND SULFUR,
GTE Labs., Inc., Bayside, N.Y.
C. Persiani, and W. D. Shelby.
Environmental Science and Technology, Vol 7, No 2, p 125-127, February 1973. 2 tab, 6 ref.

Descriptors: *Neutron activation analysis, *X-ray fluorescence, *Sulfur, *Sodium, Heavy metals, Oil, Pollutant identification, *Non-destructive tests.
Identifiers: *Fuel oil (No. 6), Detection limits, *Vanadium, Sample preparation, Atomic absorption spectrophotometry, Fuel oil, Oil characterization, Scintillation counting, Precision, Errors.

Samples of No. 6 (bunker) fuel oil were analyzed for sodium and vanadium by neutron activation analysis and for sulfur and vanadium by x-ray fluorescence. Results from the two techniques were compared with those from atomic absorption spectrophotometry. Fuel oil samples for NAA were placed in pressed fit, polyethylene capsules, irradiated, and monitored for gamma rays using a scintillation counter composed of two NaI (Tl) crystals mounted on photomultiplier tubes. Samples for determination of sulfur by x-ray fluorescence were analyzed using the method of successive additions which involves spiking samples with known amounts of amyl ziram and back-calculating original sulfur content. These results were verified using classical methods and served as standards for succeeding samples. For vanadium analysis by x-ray spectrography, samples were ashed, the ash dissolved in HNO3, dried, triturated, and analyzed. The results show that relative errors for V and Na were 20 and 10 percent, respectively, with NAA. For x-ray spectrographic analysis, the detection limits were 10 and 500 ppm and relative precisions were plus or minus 5.0 and 1.0 percent for V and S, respectively. Interferences with both methods were minor. Since the methods require little sample preparation they should be useful for rapid analysis of fuel oils. (Little-Battelle)
W73-08540

A UNIQUE COMPUTER CENTERED INSTRUMENT FOR SIMULTANEOUS ABSORBANCE AND FLUORESCENCE MEASUREMENTS,
Michigan State Univ., East Lansing. Dept. of Chemistry; and Michigan State Univ., East Lansing. Dept. of Biochemistry.
For primary bibliographic entry see Field 07B.
W73-08541

PERSISTENCE AND REACTIONS OF C-1-4-CACODYLIC ACID IN SOILS,
Agricultural Research Service, Beltsville, Md. Agricultural Environmental Quality Inst.
For primary bibliographic entry see Field 05B.
W73-08542

A MALLOMONAS BLOOM IN A BULGARIAN MOUNTAIN LAKE,
Copenhagen Univ. (Denmark). Inst. of Plant Anatomy and Cytology.
J. Kristiansen.
Nova Hedwigia, Vol 21, Nos. 2-4, p 877-882, 1971. 4 fig, 7 ref.

Descriptors: *Electron microscopy, *Pollutant identification, Eutrophication, *Phytoplankton, Chrysophyta, Aquatic algae, Sampling, Protozoa.
Identifiers: *Ultrastructure, *Mallomonas acaroides var. acaroides, *Lake Wapsko (Bulgaria), Sample preservation, Sample preparation, *Bulgaria, Mallomonas acaroides var. galeata, Flagellates.

Electron microscopic examinations were made of samples of Mallomonas taken from Lake Wapsko, south of Sofia, Bulgaria. At the time of sampling the water temperature was 10C and the water was quite turbid due to a mass development of Mallomonas. The samples were fixed in Bouin's fluid, and the material for electron microscopy was repeatedly washed in distilled water by means of a centrifuge, dried on to carbon-coated grids and shadowcast with chromium. The preparations were examined in a JEM-T 7 electron microscope. Other grids with material were coated with gold, and examined in a Cambridge Stereoscan Mk IIa scanning electron microscope. The samples were shown to contain only one species, Mallomonas acaroides var. acaroides (Syn. M. a. var. galeata), and is a confirmation of previously published data concerning its distribution. (Holoman-Battelle)
W73-08545

CHARACTERIZATION AND IDENTIFICATION OF SPILLED RESIDUAL FUEL OILS BY GAS CHROMATOGRAPHY AND INFRARED SPECTROPHOTOMETRY,
National Environmental Research Center, Cincinnati, Ohio.
F. K. Kawahara.
Journal of Chromatographic Science, Vol 10, No 10, p 629-636, October 1972. 10 fig, 4 tab, 17 ref.

Descriptors: *Sampling, *Oil spills, *Gas chromatography, Separation techniques, Oil, Density, Pollutant identification.
Identifiers: *Sample preparation, *Oil characterization, *Infrared spectrophotometry, *Aging (Physical), Naphtha, Gasoline, Jet fuel, Kerosene, No. 1 fuel oil, No. 2 fuel oil, No. 5 fuel oil, No. 6 fuel oil, Crude oil, Petroleum jelly, Gas oil, White oil, Motor oil, Asphalt, Grease, Lubricating oil, Preconcentration, Paraffins, Fractionation, Infrared spectra, Chromatograms, Electron capture gas chromatography, Flame ionization gas chromatography.

Analytical methods developed recently at the Analytical Quality Control Laboratory are described for the characterization and identification of heavy residual fuel oil pollutants found in surface waters. Procedures are described for sample collection, extraction, concentration, and analysis. Identity can be made through use of each of

the four GC techniques and infrared analytical procedure even when two different oils are spilled near the same area at about the same time. Infrared spectral differences reveal the approximate ages of the spills. A new electron capture detector gas chromatographic procedure designed for the diagnostic identification of heavier petroleum products shows excellent promise. (Little-Battelle)
W73-08547

THE PERCENT UN-IONIZED AMMONIA IN AQUEOUS AMMONIA SOLUTIONS AT DIFFERENT PH LEVELS AND TEMPERATURES,
British Columbia Dept. of Recreation and Conservation, Victoria. Fish and Wildlife Branch.
R. P. Trussell.
Journal of the Fisheries Research Board of Canada, Vol 29, No 10, p 1505-1507, October 1972. 2 tab, 9 ref.

Descriptors: *Toxicity, *Water temperature, *Hydrogen ion concentration, *Ionization, *Ammonia, Water analysis, Ions, Ammonium salts.

Previous studies have shown that the toxicity of aqueous ammonia or ammonium salt solutions is dependent largely on the pH of the solution since only the un-ionized molecule is toxic to fish. So that the amount of toxic ammonia can be determined, a table was constructed which shows percentage of un-ionized ammonia in aqueous solutions at different pH values and temperatures. The values were calculated using accurate ionization constants. (Little-Battelle)
W73-08550

MERCURY CONTENT OF SPINY DOGFISH (SQUALUS ACANTHIAS) IN THE STRAIT OF GEORGIA, BRITISH COLUMBIA,
Fisheries Research Board of Canada, Nanaimo (British Columbia). Biological Station.
C. R. Forrester, K. S. Ketchen, and C. C. Wong.
Journal of the Fisheries Research Board of Canada, Vol 29, No 10, p 1487-1490, October 1972. 2 fig, 2 tab, 6 ref.

Descriptors: *Mercury, *Heavy metals, Embryonic growth stage, *Sharks, Marine fish, Elasmobranchs, *Canada, Sampling, Chemical analysis, Pollutant identification.
Identifiers: *Spiny dogfish, Squalus acanthias, *Strait of Georgia (Brit. Col.), Flameless atomic absorption spectrophotometry, Biological samples, Sample preparation.

Dogfish were collected with a small-meshed otter trawl, longline gear, and handlines in four areas of the Strait of Georgia during a study conducted to determine whether or not there was any systematic pattern of mercury content in fish from these areas. A total of 685 dogfish were captured and 206 flesh samples taken from the dorsal musculature between the first and second dorsal fins were analyzed. Sets of zero plus and one plus intrauterine embryos were obtained and analyzed for Hg content. Total mercury content (ppm wet weight) of the samples was determined through wet digestion and flameless atomic absorption spectrophotometry, according to the method described by Armstrong and Uthe (1971). The total mercury content of Squalus acanthias reached levels of 0.5 ppm at fish lengths of 72 and 77 cm for male and female fish, respectively. For any given length above 65 cm the mercury content was higher among males than females and higher in samples taken off the Fraser River Estuary than in other areas of the Strait. Levels of mercury reached 1.7 ppm in males (to 95 cm in total length) and almost 2.0 ppm in females (to 120 cm in total length). Mercury content in the embryos ranged from 0.01 to 0.05 ppm with no age differences. (Holoman-Battelle)
W73-08551

FATTY ACIDS IN SURFACE PARTICULATE MATTER FROM THE NORTH ATLANTIC,
Rhode Island Univ., Kingston. Graduate School of Oceanography.
D. M. Schultz, and J. G. Quinn.
Journal of the Fisheries Research Board of Canada, Vol 29, No 10, p 1482-1486, October 1972. 2 tab, 22 ref.

Descriptors: *Atlantic Ocean, Chemical analysis, *Water analysis, Surface waters, *Pollutant identification, Saline water, Water sampling, Organic acids, Organic matter, Estuaries, Solvent extractions, Separation techniques, Sea water.
Identifiers: *Fatty acids, *Particulate matter, *Narragansett Bay, Sample preparation, Thin layer chromatography, Flame ionization gas chromatography, Gas liquid chromatography.

On R/V Trident Cruise 102 from Reykjavik, Iceland, to Halifax, Nova Scotia (August 1971), samples were taken at seven stations to determine the fatty acid composition of open-ocean surface particulate matter and to compare it with particulate matter in estuarine samples from Narragansett Bay, R. I. Surface samples (20 cm depth) were collected in polyethylene carboys and filtered through Gelman type A glass-fiber filters. The filters were placed in culture tubes and stored at a minus 20C in the ship's freezer for periods up to one month. After transferring the samples to the laboratory for analysis, the following were added (in the order given): an internal standard (17:0), KOH/MeOH, MeOH, and benzene. The samples were saponified and the methyl esters were extracted, and separated and purified using preparative TLC. The esters were then extracted from the silicic acid and analyzed by GLC. The estuarine samples were collected in glass containers at flood tide and prepared and analyzed as above. Values of total fatty acids (free and esterified) ranged from 4 to 26 micrograms. A high proportion of the fatty acids was long-chain polyunsaturated acids. The low relative abundance of iso and anteiso 15-carbon acids indicated little bacterial contribution to the particulate matter. This fatty acid distribution was in contrast to that found in estuarine particulate matter, which contained only trace amounts of the long-chain polyunsaturated acids and substantial quantities of branched chain acids. (Holoman-Battelle)
W73-08552

CARBON DIOXIDE CONTENT OF THE INTERSTITIAL WATER IN THE SEDIMENT OF GRANE LANGSO, A DANISH LOBELIA LAKE,
Copenhagen Univ. (Denmark). Freshwater Biological Lab.
S. Wium-Andersen, and J. M. Andersen.
Limnology and Oceanography, Vol 17, No 6, p 943-947, November 1972. 4 fig, 1 tab, 9 ref.

Descriptors: *Sediments, *Carbon dioxide, *Connate water, Chemical analysis, *Photosynthesis, Water analysis, Lakes, Sampling.
Identifiers: Sample preparation, *Lobelia dortmanna, *Lake Grane Langso, *Denmark, Litorella, Isoetes.

Sediment samples were collected with Berspex tubes from various depths of Lake Grane Langse for analysis of CO2 in the interstitial water. Since interstitial water could not be recovered from the sediment, CO2 was determined directly by a modification of the method of Krogh and Rehberg. In this method, boiling water was added to the sample to drive off free CO2 and that from HCO3. The gas was collected in a receiver flask of a still containing a known amount of Ba (OH)2. The amount of BaCO3 formed was calculated by titrating the remaining Ba (OH)2 with HCl. The results showed CO2 content of the interstitial water to be between 1 and 5 mmole per liter. It is concluded that the sediment must liberate CO2 to the lake water in amounts sufficient for optimal photosynthesis of Lobelia. Zonation of Isoetes, Littorella, and Lobelia in the lake cannot be correlated with the CO2 content of the sediment. (Little-Battelle)
W73-08555

IMPROVED TECHNIQUE FOR ANALYSIS OF CARBOHYDRATES IN SEDIMENTS,
Rosenstiel School of Marine and Atmospheric Sciences, Miami, Fla.
S. M. Gerchakov, and P. G. Hatcher.
Limnology and Oceanography, Vol 17, No 6, p 938-943, November 1972. 5 fig, 1 tab, 21 ref.

Descriptors: *Calibrations, *Carbohydrates, *Sediments, *Spectrophotometry, Carbon, Analytical techniques.
Identifiers: Errors, *Total organic carbon, Absorbance, Phenol-sulfuric acid method, Sample preparation, Mangrove Lake, Bermuda.

The phenol-sulfuric acid method for analysis of carbohydrates in sediments has been modified to improve reproductibility and eliminate extraneous color development. Sediment samples were collected from Mangrove Lake, Bermuda for analysis. After filtration, the samples were crushed and dried. Samples to be analyzed were divided into three series. Phenol solution and conc. H2SO4 were added to the first; water and conc. H2SO4 were added to the second; and phenol and water were added to the third. The absorbance of each solution was determined and the results used to correct for absorbances due to sample/sulfuric acid, sample/phenol, and phenol/sulfuric acid interactions. Carbohydrate content, as glucose, was then determined using a calibration curve constructed using glucose standards. Total organic carbon was also determined by dry combustion of the samples and absorption of the evolved CO2. Statistical treatment of the absorbances from the three samples indicated that absorbance from sample/phenol or glucose/phenol interactions was insignificant with this sample but may have to be considered with others. Absorbance due to phenol/sulfuric acid interaction can generally be neglected. Correction for absorbance due to sediment/sulfuric acid is necessary with this method. Carbohydrate values obtained with the modified method were generally lower than those obtained with the unmodified method. (Little-Battelle)
W73-08556

A COMPARISON AT SEA OF MANUAL AND AUTOANALYZER ANALYSES OF PHOSPHATE, NITRATE, AND SILICATE,
Oregon State Univ., Corvallis. School of Oceanography.
S. W. Hager, E. L. Atlas, L. I. Gordon, A. W. Mantyla, and P. K. Park.
Limnology and Oceanography, Vol 17, No 6, p 931-937, November 1972. 3 fig, 2 tab, 17 ref.

Descriptors: *Phosphates, *Nitrates, *Silicates, *Colorimetry, Calibrations, *Sea water, Nutrients, Sampling.
Identifiers: Precision, On board analysis, AutoAnalyzer.

Data are presented from a comparison made at sea of automated and manual methods of analysis for phosphate, nitrate plus nitrite, and silicate. An AutoAnalyzer was used for the automated analyses and colorimetric methods, which are described, were used in the manual analyses. Samples were collected in surface buckets and in NIO (Nat. Inst. Oceanogr.) bottles from standard hydrographic depths. Statistical treatment of the results showed that both methods give comparable precision, plus or minus 1 percent, and no significant systematic discrepancies exist between the two technologies for phosphate and silicate analyses. A small discrepancy was found in the nitrate work. (Little-Battelle)
W73-08557

DECOMPOSITION OF DISSOLVED ORGANIC CARBON AND NITROGEN COMPOUNDS FROM LEAVES IN AN EXPERIMENTAL HARD-WATER STREAM,
Michigan State Univ., Hickory Corners. W. K. Kellogg Biological Station.
For primary bibliographic entry see Field 05B.
W73-08558

A METHOD FOR THE IN SITU STUDY OF ZOOPLANKTON GRAZING EFFECTS ON ALGAL SPECIES COMPOSITION AND STANDING CROP,
Yale Univ., New Haven, Conn. Dept. of Biology.
K. G. Porter.
Limnology and Oceanography, Vol 17, No 6, p 913-917, November 1972. 1 fig, 3 tab, 19 ref.

Descriptors: *Grazing, *Zooplankton, *Standing crops, Plant populations, *Phytoplankton, Cyanophyta, Diatoms, Chlorophyta, Chrysophyta, Dinoflagellates, Pyrrophyta, On-site tests, Protozoa, Equipment, Copepods, Chrysophyta.
Identifiers: Diaptomus minutus, Epischura lacustris, Daphnia galeata mendotae, Cyclops scutifer, Macroinvertebrates, Desmids, Flagellates.

A method for in situ study of the effects of grazing on the species composition and standing crop of a natural phytoplankton assemblage is described. Polyethylene enclosures 0.5 cu m in volume are filled with whole lake water or water filtered through 125-micron (No. 10) mesh to remove the major grazers. After 4 days of incubation, contents are sampled and cells counted by species. The bagged whole lake water is also compared with natural lake water. The total number of small algal cells (2-30 microns), small flagellates, large dinoflagellates, large chrysophytes, and ciliates are higher and gelatinous greens are lower in the absence of grazers. There is no detectable experimental effect on the total number of large cells (greater than 30 microns), blue-greens, desmids, small chrysophytes, diatoms, and nonblue-green filaments. (Little-Battelle)
W73-08559

ATP CONTENT OF CALANUS FINMARCHICUS,
Dalhousie Univ., Halifax (Nova Scotia). Inst. of Oceanography.
N. Balch.
Limnology and Oceanography, Vol 17, No 6, pp 906-908, November 1972. 1 tab, 6 ref.

Descriptors: *Biomass, *Food abundance, Carbon, Nitrogen, Copepods, Invertebrates, Statistical methods.
Identifiers: *Calanus finmarchicus, *Adenosine triphosphate, *Organic carbon, Sample preparation.

Measurements of adenosine triphosphate (ATP), carbon, and nitrogen were made on Calanus finmarchicus held in a food-free environment in the laboratory. Over a 23-day starvation period there were significant reductions of absolute amounts of carbon, nitrogen, and ATP, but no significant changes in the relationship between ATP and body carbon. Relative ATP levels in organisms remain sufficiently constant over a range of physiological conditions so as to make them good indicators of biomass. ATP:carbon ratios in lipid-storing copepods are also considered. (Little-Battelle)
W73-08560

TRACE ELEMENTS IN CLAMS, MUSSELS, AND SHRIMP,
Institut Royal des Sciences Naturelles de Belgique, Brussels.
For primary bibliographic entry see Field 05B.
W73-08561

A TECHINQUE FOR THE ESTIMATION OF INDICES OF REFRACTION OF MARINE PHYTOPLANKTERS,
Oregon State Univ., Corvallis. School of Oceanography.
K. L. Carder, R. D. Tomlinson, and G. F. Beardsley, Jr.
Limnology and Oceanography, Vol 17, No 6, p 833-839, November 1972. 4 fig, 2 tab, 24 ref.

Descriptors: *Phytoplankton, *Cultures, *Distribution patterns, *Growth rates, Sea water, Sampling, Chrysophyta, Particle size.
Identifiers: *Isochrysis galbana, *Index of refraction, *Optical systems, Coulter counter.

Measurements of light scattering and particle size distribution were performed on a growing culture of the unicellular phytoplankter Isochrysis galbana. The culture represented a narrow, polydisperse distribution of nearly spherical particles. Assuming the culture to be homogeneous in refractive index, a technique was developed that provided an estimate of the index of refraction of the culture for the wavelengths 5,460 Angstrom and 5,780 Angstrom. The relative index of refraction (relative to that of seawater) of the culture varied with time from 1.026 to 1.036 over a 12-day sampling period and seemed to be related to changes in the surface area:volume ratio of the cells. The indices of refraction determined using green light (5,460 Angstrom) corresponded closely with those found using yellow (5,780 Angstrom), with slight fluctuations perhaps due to changes in cells pigmentation ratios. (Little-Battelle)
W73-08564

USE OF ISOTOPIC ABUNDANCE RATIOS IN IDENTIFICATION OF POLYCHLORINATED BIPHENYLS BY MASS SPECTROMETRY,
Stanford Univ., Pacific Grove, Calif. Hopkins Marine Station.
J. W. Rote, and W. J. Morris.
Journal of the Association of Official Analytical Chemists, Vol 56, No 1, p 188-199, January 1973. 10 fig, 3 tab, 34 ref.

Descriptors: *Polychlorinated biphenyls, *Pollutant identification, *Mass spectrometry, Chemical analysis, *Industrial wastes, Gas chromatography.
Identifiers: *GC-Mass spectrometry, *Isotopic abundance ratios, Aroclor 1232, Aroclor 1254, Aroclor 1268, Isomers, Polychlorinated terphenyls, Chlorinated naphthalenes.

Polychlorinated biphenyls are industrial compounds which are being detected throughout the global ecosystem. Because of the presence of other residues, combined gas chromatography-mass spectrometry must be used for their confirmation. Using isotope abundance ratios, the theoretical probability of the occurrence of ions of different masses in the molecular cluster has been calculated for the polychlorinated biphenyls, polychlorinated terphenyls, and chlorinated naphthalenes. Mass spectra of mono- through decachlorobiphenyl have been taken with a unit resolution, computer-controlled GC-MS system and parent ion clusters were matched with the theoretical isotopic patterns. This method provides the unambiguous identification of polychlorinated biphenyls in the presence of other substances. (Holoman-Battelle)
W73-08565

GAS-LIQUID CHROMATOGRAPHIC SEPARATION OF N-ACETYL-N-BUTYL ESTERS OF AMINO ACIDS,
Agricultural Research Service, Beltsville, Md. Agricultural Marketing Research Inst.
P. G. Vincent, and J. Kirksey.
Journal of the Association of Official Analytical Chemists, Vol 56, No 1, p 158-161, January 1973. 1 fig, 1 tab, 13 ref.

Descriptors: *Separation techniques, *Amino acids.
Identifiers: *Gas liquid chromatography, Proline, Threonine, Homoserine, 4-aminobutyrate, Methionine, Citrulline, Arginine, Aspartate, Phenylalanine, Ornithine, Glutamine, Lysine, Histidine, Tyrosine, Tryptophan, *Esters, N-acetyl-n-butyl esters, Chromatography, Retention time, Elution.

Gas-liquid partition chromatography of a number of N-acetyl-n-butyl esters of amino acids has been investigated. Results obtained with a column packed with methyl silicone grease (DC-200, 12,500 cst viscosity) were better than those reported for Carbowax 1540 or hydrogenated vegetable oil. Amino acid derivatives were distinctly resolved on methyl silicone grease columns. Preliminary determinations were obtained for synthetic mixtures of the acids. The method should prove a useful adjunct to current techniques for the separation and quantitative measurement of amino acids. (Little-Battelle)
W73-08566

COLLABORATIVE STUDY OF THE CATION EXCHANGE CAPACITY OF PEAT MATERIALS,
Michigan Dept. of Agriculture, East Lansing.
For primary bibliographic entry see Field 05B.
W73-08567

ON-LINE COMPUTER SYSTEM FOR AUTOMATIC ANALYZERS,
Food and Drug Administration, Chicago, Ill.
For primary bibliographic entry see Field 07C.
W73-08568

APPLICATION OF A LABORATORY ANALOG--DIGITAL COMPUTER SYSTEM TO DATA ACQUISITION AND REDUCTION FOR QUANTITATIVE ANALYSES,
Department of Agriculture, Agassiz (British Columbia). Research Station.
For primary bibliographic entry see Field 07C.
W73-08569

COLLABORATIVE STUDY OF A SIMPLIFIED HALPHEN PROCEDURE FOR THE QUANTITATIVE DETERMINATION OF LOW LEVELS OF CYCLOPROPENE FATTY ACIDS,
Food and Drug Administration, Washington, D.C. Div. of Chemistry and Physics.
E. C. Coleman.
Journal of the Association of Official Analytical Chemists, Vol 56, No 1, p 82-85, January 1973. 3 tab, 16 ref.

Descriptors: *Pollutant identification, Organic acids, Methodology, Chemical analysis.
Identifiers: *Collaborative studies, Interlaboratory studies, *Corn oil, *Cottonseed oil, Method evaluation, Fatty acids, *Cycloprene fatty acids, Precision, Halphen procedure, Quantitative analysis.

A collaborative study was conducted on a simplified Halphen procedure for the quantitative determination of low levels of cyclopropene fatty acids. Twelve laboratories (some of these participated in a precollaborative study of this procedure) analyzed 9 samples consisting of mixtures of transesterified corn oil and cottonseed oils, whose cyclopropene content ranged from 0.00 to 0.19 percent. The amount of cyclopropene fatty acids in the samples was estimated in the Associate Referee's laboratory from HBr titration data. A statistical evaluation of the collaborative data indicated good precision and accuracy. Evidence for a significant between-laboratory systematic error could not be found. It is recommended that work be continued on development of a suitable calibration procedure and/or acquisition of a reference standard. (Holoman-Battelle)

W73-08570

REVIEW OF THE SCHOENEMANN REACTION IN ANALYSIS AND DETECTION OF ORGANOPHOSPHORUS COMPOUNDS,
Edgewood Arsenal, Md. Army Development and Engineering Directorate.
E. J. Poziomek, and E. V. Crabtree.
Journal of the Association of Official Analytical Chemists, Vol 56, No 1, p 56-62, January, 1973. 3 tab, 19 ref.

Descriptors: *Chemical reactions, *Organophosphorus compounds, *Pollutant identification, *Color reactions, Chemical analysis, Methodology, Inhibitors, Organic compounds, Inorganic compounds, Cations, Anions, Chemistry.
Identifiers: *Schoenemann reaction, Ethyl N N-dimethylphosphoramido cyanidate, Isopropyl methylphosphonofluoridate, Chemical indicators, Aromatic amines, Sensitivity, Chemical interference.

The chemistry of the Schoenemann reaction is reviewed and the principles and applications in the detection of organophosphorus compounds are described. Emphasis is placed on the analysis of the very toxic compounds ethyl N, N, -dimethylphosphoramido cyanidate and isopropyl methylphosphonofluoridate. There are many publications including government reports which illustrate applicability of the Schoenemann reaction. Key literature references are mentioned; also, there are many citations of unpublished data. (Holoman-Battelle)
W73-08571

CONDITIONING OF POLYALKYL GLYCOL LIQUID PHASES FOR FLAME PHOTOMETRIC GAS CHROMATOGRAPHIC ANALYSIS OF DURSBAN AND ITS OXYGEN ANALOG,
Department of Agriculture, Lethbridge (Alberta). Research Station.
D. L. Struble.
Journal of Association of Official Analytical Chemists, Vol 56, No 1, p 49-52, January, 1973. 2 fig, 2 tab, 11 ref.

Descriptors: *Phosphothioate pesticides, Chemical analysis, *Organophosphorus pesticides, Methodology, Insecticides.
Identifiers: *Dursban, O O-diethyl 0-3 5 6-trichloro-2-pyridyl phosphate, *Sample preparation, *Flame photometric gas chromatography, O O-diethyl 0-3 5 6-trichloro-2-pyridyl phosphorothioate.

Dursban and its oxygen analog were resolved by 3 liquid phases, Ucon 75-H-90,000 and Carbowaxes 20M and 20M TPA, on unsilanized, acid-washed Chromosorb W. The GLC responses and resolutions of the 2 compounds were dependent upon the conditioning of the packing before it was placed in the GLC columns. The most satisfactory results were obtained when the column packing was heated in the presence of atmospheric oxygen. The best liquid phase for the GLC analysis of Dursban and its oxygen analog was Ucon 75-H-90,000. (Holoman-Battelle)
W73-08572

GAS-LIQUID CHROMATOGRAPHIC DETERMINATION OF METHYL ISOTHIOCYANATE IN SOILS,
Ontario Dept. of Agriculture and Food, Guelph, Provincial Pesticide Residue Testing Lab.
G. J. Sirons.
Journal of the Association of Official Analytical Chemists, Vol 56, No 1, p 41-44, January, 1973. 3 fig, 4 tab, 5 ref.

Descriptors: *Soil analysis, *Pesticide residues, *Pollutant identification, *Chemical analysis, Methodollogy, Fumigants, Soil contamination, Sulfur compounds, Soil sterilants, Solvent extractions, Separation techniques, Muck soils.
Identifiers: *Methyl isothiocyanate, *Vorlex, Flame photometric gas chromatography, Conductive gas chromatography, Detection limits, Recovery, Sample preparation, Gas liquid chromatography, Organic solvents, Mineral soils.

Residues of methyl isothiocyanate, the active ingredient (20 percent) in the soil fumigant Vorlex, in soils were extracted with diethyl ether containing 5 percent ethanol, concentrated in a Kuderna-Danish concentrator, and subjected to gas-liquid chromatography without further cleanup. A 6 percent Carbowax 20M column was used in conjunction with either conductivity (nitrogen mode) or flame photometric (sulfur mode) detection systems. Two types of soils, mineral and organic (muck), were used for recovery tests. The soils were air-dried at room temperature, fortified with microgram quantities of CH3NCS, and mixed thoroughly for 60 minutes. Extractions were made immediately and at 3, 7, 14, and 28 days pot-fortification. The observed limits of detection of methyl isothiocyanate were approximately 4.5 ng with the flame photometric detector and 5 ng with the conductivity detector. Recoveries from fortified soils ranged from 80-86 percent using the Kuderna-Danish concentrator. The method is rapid and capable of determining methyl isothiocyanate residues in soils at a level as low as 0.01 ppm. (Holoman-Battelle)
W73-08573

EVALUATION OF CHEMICAL CONFIRMATORY TESTS FOR ANALYSIS OF DIELDRIN RESIDUES,
Department of Agriculture, Ottawa (Ontario). Plant Products Div.
R. B. Maybury, and W. P. Cochrane.
Journal of the Association of Official Analytical Chemists, Vol 56, No 1, p 36-40, January, 1973. 3 fig, 17 ref.

Descriptors: *Pesticide residues, *Dieldrin, *Chemical reactions, *Pollutant identification, Laboratory tests, Evaluation, Chemical analysis, Chlorinated hydrocarbon pesticides, Solvent extractions, Separation techniques, Methodology, Insecticides.
Identifiers: Reagents, Sample preparation, Electron capture gas chromatography, Cleanup, Organic solvents, Gas liquid chromatography, Sensitivity, Derivatization.

Eight of the more commonly used reagents for the confirmation of dieldrin at the residue level were compared for several substrates. After an aliquot of the standard or sample extract was placed in a glass-stoppered centrifuge tube, the solvent was evaporated. The reagent was added, and the tube placed in boiling water bath for 30 min. After cooling, the contents were diluted with distilled H20, mixed, and shaken upon the addition of hexane. The hexane layer was dried and injected into a gas chromatograph. Dry (animal feeds) samples were extracted with hexane, and cleaned up on a column as above. In some instances derivatives were isolated and identified. Two reagents, aqueous HBr solution and BC13/2-chloroethanol, were especially useful because of their application and sensitivity, i.e., 0.0003 ppm for a 10 g dry sample and 0.001 ppm for a 25 g wet sample. The ZnC12/HCl reagent was a practical alternative to the BC13/2-chloroethanol reagent. The HBr/Ac20 reagent gave a more positive confirmation at a lower sensitivity. (Holoman-Battelle)
W73-08574

FLUOROMETRIC DETERMINATION OF OXYTETRACYCLINE IN PREMIXES,
Rutgers - The State Univ., New Brunswick, N. J. Coll. of Agriculture and Environmental Science.
S. E. Katz, and C. A. Fassbender.
Journal of the Association of Official Analytical Chemists, Vol 56, No 1, p 17-19, January, 1973. 3 tab, 10 ref.

Descriptors: *Antibiotics (Pesticides), *Chemical analysis, *Aqueous solutions, *Pollutant identification, Methodology, Fluorometry, Fluorescence, Assay.
Identifiers: *Oxytetracycline, Chemical interference, Recovery, *Premixes, Chlortetracycline, Sample preparation, Sensitivity.

A simple fluorometric procedure is presented for the determination of oxytetracycline in which a highly sensitive fluorometer and ultrapure deionized water are used to eliminate background fluorescence. Standard solutions are mixed with 1 N NH4OH, allowed to stand for 15 min and the fluorescence intensity is measured. Premixes are mixed with an extracting solution for 30 min by shaking; the extract is settled, filtered and diluted with 1 NH4OH for fluorescence intensity measurements. Recoveries from fortified extracts of commercial premixes ranged from 95.0 to 102.5 percent; the ratio of results of microbiological to fluorometric methods ranged from 0.97 to 1.05 percent. The procedure is reasonably specific for oxytetracycline in relationship to interference from chlortetracycline because there is a significant difference between excitation and emission wave lengths for these compounds: 390 and 520 nm for oxytetracycline vs. 350 and 420 nm for chlortetracycline. The main advantage of the fluorometric method over the microbiological method is that the fluorometric method requires less time and can be used effectively for quality assurance and in regulatory laboratories. (Holoman-Battelle)
W73-08575

GAS CHROMATOGRAPHIC DETERMINATION OF TRIARIMOL IN FORMULATIONS AND TECHNICAL MATERIAL,
Lilly (Eli) and Co., Indianapolis, Ind.
R. Frank, O. D. Decker, and E. W. Day, Jr.
Journal of the Association of Official Analytical Chemists, Vol 56, No 1, p 11-13, January, 1973. 2 fig, 1 tab.

Descriptors: *Fungicides, *Assay, Chlorinated hydrocarbon pesticider, Chemical analysis, *Gas chromatography, Diazinon.
Identifiers: *Triarimol, Formulations, Chemical interference, Flame ionization gas chromatography, Sample preparation, Alpha- (2 4-dichlorophenyl)-alpha-phenyl-5-pyrimidine-methanol, Precision, Captan, Disulfoton, Dicofol, Chlorpyrifos, Ethion, Malathion, Methoxychlor, Carbaryl, Maneb.

The triarimol content in formulations and technical materials is determined by flame ionization gas-liquid chromatography after the sample is dissolved in or extracted with chloroform. Pesticides commonly occurring with triarimol do not interfere in this method. Replicate injections of emulsifiable concentrate and wettable powder samples showed good precision. The described procedure has been successfully used for the determination of triarimol in experimental combination formulations containing one of the following pesticides: captan, diazinon, disulfoton, chlorpyrifos, ethion, dicofol, malathion, methoxychlor, carbaryl, and maneb. (Holoman-Battelle)
W73-08576

DEVELOPMENT OF SIMULIUM (PSILOZIA) VITTATUM ZETT (DIPTERA: SIMULIIDAE) FROM LARVAE TO ADULTS AT INCREMENTS FROM 17.0 TO 27.0 C,
Batelle-Pacific Northwest Labs., Richland Wash.
For primary bibliographic entry see Field 05C.
W73-08577

CONFIRMATION OF PESTICIDE RESIDUE IDENTITY. IV. DERIVATIVE FORMATION IN SOLID MATRIX FOR THE CONFIRMATION

OF ALPHA- AND BETA-ENDOSULFAN BY GAS CHROMATOGRAPHY,
Department of the Environment, Ottawa (Ontario). Inland Waters Branch.
A. S. Y. Chau, and K. Terry.
Journal of the Association of Official Analytical Chemists, Vol 55, No 6, p 1228-1231, November, 1972. 4 fig, 8 ref.

Descriptors: *Pesticide residues, *Chlorinated hydrocarbon pesticides, *Pollutant identification, Methodology, Insecticides, Chemical analysis, *Gas chromatography, Solvent extractions.
Identifiers: *Alpha-endosulfan, *Beta-endosulfan, Derivatization, Electron capture gas chromatography, Acetylation, Isomers, Endosulfan diacetate, Gas liquid chromatography, Sample preparation, Organic solvents.

The new solid matrix derivation procedure has now been applied to the confirmation of endosulfan residue identity. This procedure involves the conversion of endosulfans to the same diacetate in alumina impregnated with H2SO4 and acetic anhydride. The concentrated sample extract or standard solution is applied to the surface of the solid matrix in the microcolumn. The column is heated for two hours and the eluted with benzene. The eluate is then examined, with and without concentration, by electroncapture gas-liquid chromatography. Comparable yield of the diacetate was obtained from the present approach and from a previously reported acetylation method. Of the various experimental conditions investigated, the best conditions included derivatization for 2 hr at 100C in solid matrix of alumina-acetic anhydride-H2SO4 (50 plus 10 plus 5) (W/V/V). The advantage of the present method over the previously reported procedure is discussed, and the applicability of this method to the confirmation of endosulfan in fish and water is illustrated. See also W73-08579 (Holoman-Battelle)
W73-08578

CONFIRMATION OF PESTICIDE RESIDUE IDENTITY. V. ALTERNATIVE PROCEDURE FOR DERIVATIVE FORMATION IN SOLID MATRIX FOR THE CONFIRMATION ALPHA- AND BETA-ENDOSULFAN BY GAS CHROMATOGRAPHY,
Department of the Environment, Burlington (Ontario). Centre for Inland Waters.
A. S. Y. Chau.
Journal of the Association of Official Analytical Chemists, Vol 55, No 6, p 1232-1238, November, 1972. 6 fig, 2 tab, 32 ref.

Descriptors: *Pesticide residues, *Chlorinated hydrocarbon pesticides, *Pollutant identification, Insecticides, Methodology, Chemical analysis, Fish, Sediments, Water analysis, Solvent extractions.
Identifiers: *Alpha-endosulfan, *Beta-endosulfan, Electron capture gas chromatography, Detection limits, Derivatization, Endosulfan ether, Isomers, Sample preparation, Organic solvents.

A quick and sensitive new method has been developed for the confirmation of alpha- and beta-endosulfan by conversion to the same ether in a solid matrix. It seems by far to be the most sensitive method reported to date for positive identification of alpha- and beta-endosulfan. As little as 0.005 ppm of the parent compounds in a 10 g fish or sediment extract and 0.003 ppb in a 2 l water extract can be routinely confirmed. (Holoman-Battelle)
W73-08579

DETERMINATION OF MATACIL AND ZECTRAN BY FLUORIGENIC LABELING, THIN LAYER CHROMATOGRAPHY, AND IN SITU FLUORIMETRY,
Dalhousie Univ., Halifax (Nova Scotia). Dept. of Chemistry.
R. W. Frei, and J. F. Lawrence.
Journal of the Association of Official Analytical Chemists, Vol 55, No 6, p 1259-1264, November, 1972. 6 fig, 21 ref.

Descriptors: *Carbamate pesticides, *Fluorometry, Pollutant identification, Methodology, Chemical analysis, Fluorescence, Nuclear magnetic resonance, Insecticides, Separation techniques, Chemical reactions, Solvent extractions.
Identifiers: *Thin layer chromatography, *Matacil, *Zectran, *Fluorigenic labeling technique, Infrared spectrophotometry, Spectrofluorimetry, Reproducibility, Detection limits, Dansyl chloride, NMR spectra, Infrared spectra, 4-dimethylamino-m-tolyl N-methylcarbamate, 4-dimethylamino-3 5-xylyl N-methylcarbamate, 4-chloro-7-nitrobenzo-2 1 3-oxadiazole, 1-dimethylamino-naphthalene-s-sulfonyl chloride, Organic solvents.

The fluorigenic labeling of Matacil (4-dimethylamino-m-tolyl N-methylcarbamate) and Zectran (4-dimethylamino-3, 5-xylyl N-methylcarbamate) with dansyl chloride (1-dimethylamino-naphthalene-5-sulfonyl chloride) results in 3 fluorescent derivatives, and labeling with NBD-Cl (4-chloro-7-nitrobenzo-2, 1, 3-oxadiazole) produces 2 fluorescent derivatives for each carbamate, all of which can be separated by thin layer chromatography (TLC). These derivatives are identified by nuclear magnetic resonance, infrared, and fluorescence spectroscopy, aided by TLC data. The carbamates are hydrolyzed in dilute base and the resulting amine or phenol hydrolysis products react with the labeling reagents. The derivatives are analyzed by TLC and in situ fluorimetry with a spectrophotometer in the fluorescence mode and a spectrophotofluorometer with the thin layer scanning accessory. Reactions, fluorescence phenomena, and chromatographic properties of the derivatives are investigated for evaluation of the method as a quantitative technique. A reproducibility of 3-5 percent relative standard deviation can be expected in the concentration range from 15 to 300 ng/spot for derivatives of the 2 labeling procedures. The dansyl derivatives are instrumentally detectable as low as 1 ng/spot while the NBD derivatives may be detected at concentrations of less than 0.5 mg/spot. (Holoman-Battelle)
W73-08580

COLORIMETRIC DETERMINATION OF PHENYLAMIDE PESTICIDES IN NATURAL WATERS,
National Research Centre, Cairo (Egypt). Water Pollution Dept.
M. A. El-Dib, and O. A. Aly.
Journal of the Association of Official Analytical Chemists, Vol 55, No 6, p 1276-1279, November, 1972. 4 tab, 23 ref.

Descriptors: *Water analysis, *Pollutant identification, *Colorimetry, Methodology, Carbamate pesticides, Urea pesticides, Chemical analysis, Color reactions, Chlorinated hydrocarbon pesticides, Efficiencies, *Organic pesticides, Solvent extractions, Separation techniques, Spectrophotometry, Monuron, Herbicides, Insecticides, Molluscicides.
Identifiers: Natural waters, *Phenylamide pesticides, Aniline derivatives, Sample preparation, Recovery, Precision, Sensitivity, IPC, CIPC, Diuron, Linuron, Neburon, Propanil, Bayluscide, Vitavax, Karsil, Dicryl, Phenylurea pesticides, Isopropyl N-phenylcarbamate, Isopropyl N- (3-chlorophenyl) carbamate, 3- (4-Chlorophenyl)-1 1-dimethylurea, 3- (3 4-Dichlorophenyl)-1 1-dimethylurea, 3- (3 4-Dichlorophenyl)-1-methoxy-1-methylurea.

Phenylamide pesticides include a great variety of compounds such as N-phenylcarbamates, phenylureas, and anilides. A simple, rapid, and sensitive colorimetric method for their determination in natural waters has been proposed. Phenylamides are rapidly hydrolyzed in acid medium at elevated temperature (150-155 degrees C), yielding the corresponding anilines. The latter compounds are diazotized and coupled with 1-naphthol to yield intensely colored azo dyes. Standard and recovery solutions of specific phenylamides were used in testing the procedure. Aliquots of the solutions were acidified with H2S04, extracted with CHC13 and evaporated just to dryness. The solution was then refluxed, mixed respectively with NaNO2 solution, sulfanic acid, 1-naphthol, and finally NaOH for maximum color development. Absorbance was read against a reagent blank. Efficiency of the hydrolytic procedure was checked by comparing 100 micrograms of each pesticide with the corresponding theoretical amounts of anilines liberated by complete hydrolysis. Recoveries of the phenylamides from tap and raw river waters ranged from 96 to 100 percent. Using the proposed method, extraction and subsequent determination of the pesticides require about 40 minutes. Both phenylamides and aniline derivatives can be determined in a sample in the presence of each other. The method is sensitive to 0.02 mg/1; coefficients of variation range between 6.0 and 0.2, according to the amount of phenylamide pesticide being measured. (Holoman-Battelle)
W73-08581

TECHNIQUES FOR SAMPLING SALT MARSH BENTHOS AND BURROWS,
Georgia Univ., Athens. Dept. of Geology.
R. W. Frey, P. B. Basan, and R. M. Scott.
The American Midland Naturalist, Vol 89, No 1, p 228-234, January, 1973. 2 fig, 9 ref.

Descriptors: *Sampling, *Benthic fauna, Separation techniques, *Muds, Laboratory equipment, Sediments, Cores, Bottom sampling, Salt marshes, Crabs.
Identifiers: *Burrow casts, *Staining, Sieving, Burrows, Polychaetes, Grass roots, Can cores, Quadrat frames.

Several methods have been developed to reduce the difficulty of sampling salt marsh epibenthos and endobenthos where grass root masses occur. Mobile animals such as crabs were collected using high-walled quadrat frames. These frames are placed while tidewater stands on the marsh. When the water ebbs away, the crabs return to the surface and can be collected. Grass is cropped and removed to eliminate obstructions while collecting the samples. Other studies showed that about 80 percent of the crabs present can be collected this way. Can cores 14x22x33 cm high were used to sample the endobenthos by cutting grass roots around the can and digging the sample out. Time for each sample collected was 2-4 minutes. Organisms were separated from the core samples containing dense grass root by sieving-staining-flotation equipment constructed from a table containing a 1 mm sieve and two No. 3 washtubs, one fitted with a sieve bottom and one fitted with a drain hole. Casts of burrows have been successfully made using polyester plastic and hardener. (Little-Battelle)
W73-08582

A FURTHER CONTRIBUTION TO THE DIATOM FLORA OF SEWAGE ENRICHED WATERS IN SOUTHERN AFRICA,
National Inst. for Water Research, Pretoria (South Africa).
For primary bibliographic entry see Field 05C.
W73-08586

BACTERIOPHAGES RECOVERED FROM SEPTAGE,
Pennsylvania Water and Gas Co., Scranton.
For primary bibliographic entry see Field 05B.
W73-08587

DIATOM COMMUNITY RESPONSE TO PRIMARY WASTEWATER EFFLUENT,
Montana State Univ., Bozeman. Dept. of Botany and Microbiology.
For primary bibliographic entry see Field 05C.
W73-08588

A NEW FRESHWATER SPECIES OF RHODOCHORTON (RHODOPHYTA, NEMALIALES) FROM VENEZUELA,
Universidad de Oriente, Cumana (Venezuela). Inst. of Oceanography.
L. G. D'Lacoste, and E. K. Ganesan.
Phycologia, Vol 11, Nos 3/4, p 233-238, December, 1972. 10 fig, 20 ref.

Descriptors: *Rhodophyta, *Systematics, Aquatic algae, Plant morphology.
Identifiers: *Venezuela, *Rhodochorton venezuelensis, Speciation.

A new freshwater species of Rhodochorton, R. venezuelensis (Nemaliales, Rhodophyta), is described from eastern Venezuela. The plants are up to 4 mm long and heterotrichous. The basal portion of erect filaments may or may not be covered by many septate, branched, downward rhizoids. Cells of erect filaments contain numerous small discoid to elongate parietal chromatophores without pyrenoids. Monosporangia were the only reproductive structures observed in the material studied. (Little-Battelle)
W73-08589

THE USE OF ATOMIC ABSORPTION SPECTROSCOPY FOR THE DETERMINATION OF PARAMETERS IN THE SOLVENT EXTRACTION OF METAL CHELATES,
John Jay Coll. of Criminal Justice, New York.
S. A.Berger.
Atomic Absorption Newsletter, Vol 12, No 1, p 30-32, January-February, 1973. 1 fig, 3 tab, 4 ref.

Descriptors: *Iron, *Solvent extractions, Heavy metals, Calibrations, Aqueous solutions, Water analysis, Chelation.
Identifiers: *Chelated metals, *Sample preparation, *Atomic absorption spectrophotometry, Chelates.

Problems of determining equilibria in the solvent extraction of metal chelates can be minimized by using atomic absorption spectroscopy. A suggested procedure involved preparation of calibration curves for both the aqueous and organic phases. Sample calibration curves were prepared for the solvent extraction system, Fe (III)-chlorendic acid, using Fe (C104)36H20 in distilled water saturated with benzene or MIBK plus chlorendic acid. The results show that AA is useful for study of the equilibria in solvent extraction of metal chelates since it is rapid and requires minimal sample preparation. Recoveries with Fe (III) were about plus or minus 3 percent. (Little-Battelle)
W73-08590

COMPARISON BETWEEN DRY ASHING AND WET DIGESTION IN THE PREPARATION OF PLANT MATERIAL FOR ATOMIC ABSORPTION ANALYSIS,
Chile Univ., Santiago. Escuela de Medicina Veterinaria.
H. C. Giron.
Atomic Absorption Newsletter, Vol 12, No 1, p 28-29, January-February 1973. 2 tab.

Descriptors: *Grasses, *Statistical methods, *Heavy metals, Sodium, Potassium, Calcium, Magnesium, Iron, Copper, Managanese, Zinc.
Identifiers: Alfalfa, Clover, *Sample preparation, *Wet ashing, *Dry ashing, *Atomic absorption spectrophotometry, Precision, Method validation.

Samples of alfalfa, clovers, and grasses were collected, pooled, chopped, dry ashed or wet digested, analyzed by atomic absorption, and the results subjected to statistical analysis to determine whether the ashing procedures affected results. Twenty-five 2-gram samples were placed in porcelain crucibles and dry ashed at 550 C for 2-3 hours in a muffle furnace. The ashed samples were then boiled in 1 N HCl and diluted with distilled water. The same number of samples were wet ashed by letting them stand overnight in concentrated HNO3. The solution was then boiled, cooled, and HC104 added. After heating, the samples were diluted with distilled water. The prepared samples were analyzed for iron, sodium, potassium, calcium, magnesium, copper, manganese, and zinc by AA. The statistical analysis showed nonsignificant differences in results except for iron concentration in alfalfa and grass. Iron appeared to be higher with dry ashing. A second series of tests using a quartz shield to protect the sample from contamination inside the furnace gave results which were not significantly different. Dry ashing appeared to give better precision, and since it is more rapid than wet digestion, it is suggested that dry ashing may be a more desirable process for sample preparation. (Little-Battelle)
W73-08591

THE GENERATION AND DETERMINATION OF COVALENT HYDRIDES BY ATOMIC ABSORPTION,
Kennecott Copper Corp., Lexington, Mass. Ledgemont Lab.
E. N. Pollock, and S. J. West.
Atomic Absorption Newsletter, Vol 12, No 1, p 6-8, January-February 1973. 3 fig, 2 tab, 10 ref.

Descriptors: *Aqueous solutions, *Heavy metals, Tin, Lead, Laboratory equipment.
Identifiers: *Atomic absorption spectrophotometry, Arsenic, Selenium, Bismuth, Germanium, Antimony, Tellurium, *Hydrides, Sample preparation, Detection limits, Silicon, *Covalent hydrides.

The use of TiC13 with magnesium metal or the use of NaBH4 as reductants and sources of nascent hydrogen for the generation of volatile hydrides from the covalent metals has extended this atomic absorption spectroscopy technique to include Bi, Sb, Te and Ge as well as As and Se. The development of an apparatus compatible with the change in chemical reactions has led to simple precise methods for the determination of these six elements. Further changes in reagents, technique or apparatus may extend the usefulness of this method to the determination of Sn, Si and Pb. The data showed excellent precision to be obtainable in the TiC13-Mg method for determination of As, Se, Sb, Bi, Te at the submicrogram level. Ge determination using NaBH4 was less sensitive and showed poorer precision. Detection limits are shown to be much better with the hydride method than with conventional AA. The method was unsuccessful with Sn, Pb, and Si. (Little-Battelle)
W73-08592

DETERMINATION OF CADMIUM IN BLOOD BY A DELVES CUP TECHNIQUE,
Oklahoma Univ., Oklahoma City. Dept. of Environmental Health.
R. D. Ediger, and R. L. Coleman.
Atomic Absorption Newsletter, Vol 12, No 1, p 3-6, January-February 1973. 2 fig, 3 tab, 6 ref.

Descriptors: *Cadmium, *Heavy metals, Methodology, Chemical analysis, *Pollutant identification.
Identifiers: *Delves cup method, *Atomic absorption spectrophotometry, *Blood, Biological samples, Absorbance, Detection limits, Body fluids.

A simple, rapid method is described for the determination of cadmium in blood utilizing the Delves cup apparatus. Heparinized blood is pipetted into the Delves cups after passage through the air-acetylene flame in order to decontaminate the surface. The cups were placed in their tray, dried at 150 C for 1 min, individually mounted on the Delves cup apparatus, and pushed almost to the center of the flame. Upon cessation of combustion, the cup was immediately pushed to the center of the flame and the Cd absorption peak was recorded. The Deuterium Background Corrector was used to compensate for nonspecific absorption. Standardization was by the method of additions on a normal blood sample spiked with cadmium to yield added concentrations of 0.50, 1.00 and 1.50 micrograms Cd/100 ml. With this procedure, less than 0.02 microgram Cd/100 ml of blood can be detected using a 10-microliter sample. The technique yields values comparable to data obtained with an extraction procedure utilizing the graphite furnace. The effects of cup positioning on absorbance and the use of background correction are discussed. (Holoman-Battelle)
W73-08593

SPECTROPHOTOMETRIC DETERMINATION OF URANIUM (VI) WITH CHROMAZUROL S AND CETYLPYRIDINIUM BROMIDE,
National Inst. for Scientific and Industrial Research, Selangor (Malaysia).
C. L. Leong.
Analytical Chemistry, Vol 45, No 1, p 201-203, January 1973. 3 fig, 5 ref.

Descriptors: *Color reactions, Aqueous solutions, *Spectrophotometry, *Heavy metals, *Pollutant identification, Chemical reactions, Separation techniques, Cations, Hydrogen ion concentration, Solvent extractions, Alkaline earth metals, Calcium, Lead, Manganese, Cobalt, Magnesium, Nickel, Zinc, Titanium, Aluminum, Chromium, Beryllium, Iron, Molybdenum, Methodology.
Identifiers: *Chromazurol, S, *Cetylpyridinium bromide, *Uranium, Absorbance, Ionic interference, Reproducibility, Molar absorptivity, Sensitivity, Chromogenic reagents, Rare earth elements, Organic solvents, Chemical interference, Chloroform, Carbon tetrachloride, Ether, Nitrobenzene, Nitromethane, Isobutyl ketone, Isoamyl alcohol, Benzyl alcohol, Tungsten, Lanthanum, Neodymium, Samarium, Gadolinium, Europium, Bismuth, Ytterbium, Dysprosium, Cerium, Thorium.

Since the uranyl ion has been found to form a soluble blue complex with chromazurol S and cetylpyridinium bromide (CPB), a study has been made of the color reaction with reference to the development of a suitable spectrophotometric method for determining U (VI). A study of the optimum conditions for color development yielded the following: (1) pH 4.8 was chosen for all absorption measurements. (2) At an average temperature of 20 C, maximum absorbance was obtained in 15 minutes and absorbance remained constant for at least 24 hours. (3) The complex was not extractable by chloroform, carbon tetrachloride, ether, nitrobenzene, nitromethane, isobutyl ketone, isoamyl alcohol, and benzyl alcohol. (4) The calibration graph obeyed Beer's law for 0-100 micrograms of U (VI)/50 ml of solution. (5) The color reaction has a molar absorptivity of 99,000 at 625 nm and a relative standard deviation of 3 percent. (6) A 100-fold weight excess of A1 (III), Cr (VI), Be (II), Fe (III), Bi (III), Mo (VI), Yb (III), Dy (III), and Ce (III) gave serious interferences, while a 2-fold weight excess of Th (IV) gave interference. Preliminary separation of U (VI) by such methods as ion exchange will be necessary before determination. (Holoman-Battelle)
W73-08594

STABILITY OF METAL DITHIOCARBAMATE COMPLEXES,
Carleton Univ., Ottawa (Ontario). Dept. of Chemistry.
R. R. Scharfe, V. S. Sastri, and C. L. Chakrabarti.
Analytical Chemistry, Vol 45, No 2, p 413-415, February 1973. 1 tab, 13 ref.

Descriptors: *Lead, *Zinc, *Nickel, *Polarographic analysis, *Solvent extractions, Stability, Aqueous solutions, Nitrilotriacetic acid, Chemical reactions, Cations, Heavy metals, Separation techniques, Organic acids, Chelation.
Identifiers: *Dithiocarbamic acids, *Metal complexes, *Stability constants, Ligands, EDTA, Pyrrolidine dithiocarbamate, Diethyl dithiocarbamate, Dimethyl dithiocarbamate, Hexamethylene dithiocarbamate, Piperazine dithiocarbamate.

The objectives were to: (1) to determine the stability constants of complexes of some divalent metal ions with a variety of N-substituted dithiocarbamic acids; and (2) determine the effect of various substituents at the nitrogen atom in disubstituted dithiocarbamic acids on the magnitude of stability constants. Aqueous solutions of the dithiocarbamic acids prepared as the Na salt, of the metal ion (Pb, Ni, Zn), and of the competing ligand (NTA or EDTA) were studied using solvent extraction and polarographic methods. There was fair agreement between the values of the stability constants obtained by those methods; the differences were possibly due to the different ionic strengths, 0.01 and 1.00, respectively, employed in the 2 methods. In the case of Pb, there was a linear relationship between the stability constant values and the pK (basicity) of three dithiocarbamic acids. In the case of Zn and Ni, there was no regular trend in the stability constants with the increasing basicity of dithiocarbamic acids. The order of the stability constants for Zn, Ni, and Pb was hexamethylene DTC greater than pipDTC greater the PyrrDTC. Pyrrolidine DTC forms complexes of the same degree of stability as the widely used diethyl DTC. However, at low pH of 1.0, pyrrolidine DTC is more stable than diethl DTC. Thus, the substitution of pyrrolidine DTC in many existing procedures which call for diethyl DTC will add an additional element of flexibility to many analytical procedures. (Holoman-Battelle)
W73-08595

AUTOMATED KJELDAHL NITROGEN DETERMINATION--A COMPREHENSIVE METHOD FOR AQUEOUS DISPERSIBLE SAMPLES,
Miles Lab., Inc., Elkhart, Ind. Marschall Div.
D. G. Kramme, R. H. Griffen, C. G. Hartford, and J. A. Corrado.
Analytical Chemistry, Vol 45, No 2, p 405-408, February 1973. 2 fig, 1 tab, 10 ref.

Descriptors: *Chemical analysis, *Aqueous solutions, *Carbohydrates, Automation, *Nitrogen, *Pollutant identification, Cations, Heavy metals, Alkaline earth metals, Alkali metals, Methodology, Color reactions, Organic compounds, Amino acids, Chromium, Manganese, Potassium, Iron, Cobalt, Magnesium, Nickel, Zinc, Copper, Cadmium, Mercury, Lead, Ureas.
Identifiers: *Kjeldahl nitrogen, *Kjeldahl procedure (Automated), Ionic interference, Chelating agents, Recovery, Sensitivity, Lithium, Chemical digestion, EDTA, Sodium potassium, tartrate, Autoanalyzer,Chemical concentration, Glucosamine, Casein, Nicotinamide.

A standardized, automated procedure has been developed for the determination of Kjeldahl N without modification regardless of the composition of the sample. A basic Technicon AutoAnalyzer System was used with a special custom made gas aspiration pipet in the continuous digestor. The Technicon procedure was modified to give a tenfold increase in sensitivity and the digester input manifold was changed to increase sample size by 50 percent. The heating stages were reversed to eliminate excess fumes. Reducing the SeO2 (catalyst) concentration from 0.3 to 0.15 percent eliminated the precipitation problem and maintained good digestion with the reversed heating stages. Various N-containing compounds were analyzed using identical conditions and recoveries were nearly 100 percent. Liquid samples, containing up to 10 percent carbohydrate can be digested without interference or further dilution. Significant interference was observed in tests on color development with 50 ppm Cr (3 plus), Mn (2 plus), Fe (3 plus), and Co (2 plus), and with 400 ppm Li, K, Mg, Ni, Zn, Cu, Cd, Hg, and Pb cations. The use of EDTA or sodium potassium tartrate results in a significant reduction in interference with some metal ions; no change in the interference of others; and with certain other ions, enhances the interference. In this comprehensive method, chelating agents were not included because sample composition is often unknown or widely varied. The automated method was compared with the manual Kjeldahl method by analyzing four unknown samples by both procedures. Good agreement of the two methods was achieved. (Holoman-Battelle)
W73-08596

FLOW PROGRAMMING IN COMBINED GAS CHROMATOGRAPHY--MASS SPECTROMETRY,
McDonnell Douglas Research Labs., St. Louis, Mo.
For primary bibliographic entry see Field 02K.
W73-08597

APPLICATION OF A WAVELENGTH SCANNING TECHNIQUE TO MULTI-ELEMENT DETERMINATIONS BY ATOMIC FLUORESCENCE SPECTROMETRY,
Imperial Coll. of Science and Technology, London (England). Dept. of Chemistry.
J. D. Norris, and T. S. West.
Analytical Chemistry, Vol 45, No 2, p 226-230, February 1973. 4 fig, 2 tab, 18 ref.

Descriptors: *Aqueous solutions, Chemical analysis, *Pollutant identification, *Heavy metals, Nickel, Cobalt, Iron, Manganese, Zinc, Cadmium, Selectivity, Alkaline earth metals, Aluminum, Calcium, Chromium, Copper, Iron, Mercury, Potassium, Magnesium, Sodium, Lead, Strontium, Titanium, Cesium.
Identifiers: *Multielemental analysis, *Atomic fluorescence spectroscopy, *Electrodeless discharge lamps, *Wavelength scanning technique, Selenium, Tellurium, Detection limits, Reproducibility, Chemical interference, Silver, Arsenic, Barium, Bismuth, Cerium, Gallium, Indium, Lithium, Niobium, Silicon, Samarium, Tin, Tantalum, Tellurium, Thorium, Vanadium, Tungsten, Zirconium.

Two dual-element electrodeless discharge lamps, operated from a single microwave generator via a two-port power divider, enable a separated air-acetylene flame to be illuminated with the intense resonance radiation of four elements. The resultant atomic fluorescence may be rapidly measured by scanning over the appropriate wavelength range. Results obtained for the sequential multi-element determination of zinc, cadmium, nickel, and cobalt show that the sensitivity and selectivity are the same by the scanning technique as by conventional atomic fluorescence spectrometry. Wavelength scans are also given for nickel, cobalt, iron, and manganese, and for selenium, tellurium, nickel, and cobalt combinations. (Holoman-Battelle)
W73-08598

IMPROVED METHOD FOR DETERMINATION OF XANTHOPHYLL IN FRESH ALFALFA AND WET FRACTIONS,
Agricultural Research Service, Berkeley, Calif. Western Marketing and Nutrition Research Div.
B. E. Knuckles, E. M. Bickoff, and G. O. Kohler.
Journal of the Association of Official Analytical Chemists, Vol 55, No 6, p 1202-1205, November 1972. 2 tab, 12 ref.

Descriptors: Methodology, *Plant pigments, *Solvent extractions, Separation techniques, Primary productivity, Colorimetry, Color, Analytical techniques.
Identifiers: *Xanthophylls, *Carotene, Organic solvents, Absorbance, Sample preparation, *Alfalfa.

An improved method has been described for the analysis of xanthophyll, as well as carotene, in fresh alfalfa. Samples of the plant are cut and chopped for uniform mixing of necessary. A quantity of the sample is mixed with absolute ethanol and filtered through fluted filter paper. An aliquot of the filtrate is then mixed with 40 percent methanolic KOH and evaporated to dryness under vacuum (60-65 C). The evaporated extract is transferred onto a chromatographic column, vacuum is applied and the pigment eluate is collected in a flask. The eluate is mixed with its eluant, and the volume is diluted with acetone and stored in the dark. In order to determine the pigmenting xanthophylls, ethanolic HCl is added to an aliquot of eluate, diluted with acetone, and mixed. The absorbance can be determined between 5 and 15 min after mixing with any suitably calibrated colorimeter or spectrophotometer. The outlined method is relatively rapid, is suitable for routine use, and measures both carotene and xanthophyll in the same extract. (Holoman-Battelle)
W73-08602

EXPENDABLE BATHYTHERMOGRAPH OBSERVATIONS FROM SHIPS OF OPPORTUNITY,
National Marine Fisheries Service, La Jolla, Calif. Fishery-Oceanography Center.
For primary bibliographic entry see Field 07B.
W73-08629

PHYTOPLANKTON AS A BIOLOGICAL INDICATOR OF WATER QUALITY,
Universidad Central de Venezuela, Caracas. Dept. of Sanitary Engineering.
For primary bibliographic entry see Field 05C.
W73-08634

GLACIERS AND NUTRIENTS IN ARCTIC SEAS,
Maine Dept. of Sea and Shore Fisheries, West Boothbay Harbor. Fisheries Research Station.
For primary bibliographic entry see Field 02K.
W73-08726

INFRARED REFLECTANCE OF SULFATE AND PHOSPHATE IN WATER,
Missouri Univ., Kansas City.
W. P. Nijm.
M Sc Thesis, 1972. 30 p, 4 fig, 19 ref. OWRR A-030-MO (3).

Descriptors: *Water chemistry, *Water properties, *Reflectance, *Optical properties, *Infrared radiation, Remote sensing, Sulfates, Phosphates, Analytical techniques, Pollutant identification.
Identifiers: Infrared reflectance.

The relative specular reflectances of the surfaces of two different aqueous solutions, one containing 0.5 M potassium sulfate and the other 0.5 M ammonium phosphate monobasic were measured throughout the 2-20 micrometer wavelength region of the infrared. Distilled water was the reflectance standard. The infrared radiant flux was incident on the surfaces at an angle of about 70 deg. Relative reflectances were measured for the polarization component having the electric field intensity vector perpendicular to the plane of incidence. Bands attributed to SO4, PO4, HPO4, and H2PO4 were observed in the relative reflectance spectra. (Knapp-USGS)

W73-08728

STANDARD POTENTIALS OF THE SILVER/SILVER-IODIDE ELECTRODE IN AQUEOUS MIXTURES OF ETHYLENE GLYCOL AT DIFFERENT TEMPERATURES AND THE THERMODYNAMICS OF TRANSFER OF HYDROGEN HALIDES FROM WATER TO GLYCOLIC MEDIA,

Jadavpur Univ., Calcutta (India). Dept. of Chemistry.
K. K. Kundu, D. Jana, and M. N. Das.

Electrochimica Acta, Vol. 18, No. 1, p 95-103, January 1973. 5 fig, 6 tab, 23 ref.

Descriptors: *Thermodynamic behavior, *Zeta potential, Aqueous solutions, Temperature, Ions, Halides, Entropy, Methodology, Chlorides, Bromides, Iodides, Anions, Hydrogen.
Identifiers: *Mixtures, *Ethylene glycol, *Ion selective electrodes, *Silver/silver iodide electrode, Solvation, Electromotive force, Hydrogen chloride, Hydrogen bromide, Hydrogen iodide, Aqueous solvents.

The standard potentials (E) of the silver/silver-iodide electrode in aqueous mixtures of ethylene glycol (containing 10, 30, 50, 70 and 90 wt-percent glycol) have been determined from emf measurement of the cell. Pt,H2 (g, 1 atm)/HOAc (ml),NaOAc (m2),KI (m3),solvent/AgI/Ag at nine temperatures ranging from 5 to 45C. These E values have been utilized to compute free energy (delta G sub t), entropy (delta S sub t) and enthalpy (delta H sub t) changes accompanying the transfer of HI from water to each of the solvents. These values as well as those for HCl and HBr obtained earlier have also been utilized to evaluate delta S sub t (i) for individual ions by a method of 'simultaneous extrapolation', which in turn furnished the values of delta H sub t (i) for these ions. These quantities and also the 'chemical' contributions for the halide ions as obtained by subtracting the 'electrostatic' contribution computed with the Born equation, have been examined in the light of ion-solvent interactions as well as the structural changes of the solvents. The observed results conform with what is expected from the competitive effects of the preferential solvating capacities of water towards halide ions and that of other solvents towards hydrogen ions, and also of the effects arising from the structural changes of the solvents that are likely to occur in the over-all transfer process. (Holoman-Battelle)
W73-08757

THE ERROR IN MEASUREMENTS OF ELECTRODE KINETICS CAUSED BY NONUNIFORM OHMIC-POTENTIAL DROP TO A DISK ELECTRODE,

California Univ., Los Angeles. School of Engineering and Applied Science.
For primary bibliographic entry see Field 02K.
W73-08758

DEEP-SEA CIRROMORPHS (CEPHALOPODA) PHOTOGRAPHED IN THE ARCTIC OCEAN,

Oregon State Univ., Corvallis. Dept. of Oceanography.
For primary bibliographic entry see Field 07B.
W73-08759

HYDROPTILA ERAMOSA A NEW CADDIS FLY FROM SOUTHERN ONTARIO (TRICHOPTERA, HYDROPTILIDAE),

Montreal Univ. (Quebec). Dept. of Biological Sciences.
For primary bibliographic entry see Field 02I.
W73-08760

THE DISTRIBUTION AND TISSUE RETENTION OF MERCURY-203 IN THE GOLDFISH (CARASSIUS AURATUS),

Wayne State Univ., Detroit, Mich. Dept. of Biology.
M. Weisbart.
Canadian Journal of Zoology, Vol. 51, No. 2, p 121-131, February 1973. 13 fig, 1 tab, 22 ref.

Descriptors: *Mercury, *Water analysis, *Bioassay, Radioactivity techniques.
Identifiers: *Goldfish, *Excretion, *Scintillation counting, *Tissue, Carassius auratus, Biological samples, Gall bladder, Gonads, Spleen, Eyes, Kidney, Intestine, Gills, Heart, Skin, Brain, Liver, Muscle, Swim bladder, Hg-203, Head kidney.

Goldfish weighing between 5.83 and 13.63 g were maintained in aquaria for use in studies of the rate of elimination of mercury. Fish were injected intraperitoneally with 10 microliters of a solution of Hg-203 labelled Hg (NO3)2. At 0 to 672 hours after injection, fish were sacrificed for analysis of mercury residues in whole-body, skin, eyes, brain, gills, heart, gall bladder, liver, gonads, intestines, spleen, kidneys, head kidney, muscle, and swim bladder. Water samples were also analyzed at each period. Hg-203 was determined by gamma counting in a well-type scintillation counter. The results showed that fish lost mercury at an apparent constant rate resulting in a biological half-life of 568 h. Correlated with this loss was a linear increase in the amount of mercury in the water. The mercury-203 content in the tissues displayed four different responses. (1) Gall bladder, gonad, and spleen tissues showed no significant regressions. (2) Eye, kidney, and intestinal tissue manifested significant losses of mercury, but the rate of loss was not significantly different from that of the body as a whole. (3) Gill, heart, skin, and swim bladder tissues lost mercury at rates faster than the body as a whole. (4) Brain, liver, muscle, and head kidney tissues showed no significant losses of mercury. (Little-Battelle)
W73-08761

CONCERNING SOME LITTORAL CLADOCERA FROM AVALON PENINSULA, NEWFOUNDLAND,

Akademiya Nauk SSSR, Moscow. Inst. of Evolutionary Morphology and Animal Ecology.
N. N. Smirnov, and C. C. Davis.
Canadian Journal of Zoology, Vol. 51, No. 1, p 65-68, January 1973. 25 ref.

Descriptors: *Waterfleas, *Littoral, *Systematics, Invertebrates, Marine animals, *Canada, Sampling, Intertidal areas.
Identifiers: Macroinvertebrates, Disparalona (Alonella) acutirostris, Chydorus sphaericus, Pleuroxus laevia, Chydorus sphaericus caelatus, Scapholeberis, Simocephalus, Chydorus piger, Acroperus alonoides, Polyphemus pediculus, Acantholeberis curvirostris, Avalon Peninsula, Streblocerus serricaudatus, Ophryoxus gracilis, Ilyocryptus, Bosmina, Alona guttata, Graptoleberis testudinaria occidentalis, Ophryoxus gracilis spinifera.

During July, 1971, six samples of littoral material were collected by C.C.D. from small bodies of water in the eastern portion of the Avalon Peninsula, Newfoundland. The samples were obtained by scraping through immersed vegetation, or other solid materials, with a small hand net constructed of 100-micron nylon netting. All identifications were made by N.N.S. The Cladocera encountered in the collections are listed. Of the 13 species and varieties that were identified, 10 are new for the island of Newfoundland, 8 are new for the Province of Newfoundland and Labrador, and 5 are new for Canada. Acroperus alonoides Hudendorff and Graptoleberis testudinaria occidentalis Sars have not previously been identified from North America. (Holoman-Battelle)
W73-08762

A CHEMOAUTOTROPHIC AND THERMOPHILIC MICROORGANISM ISOLATED FROM AN ACID HOT SPRING,

New Mexico Bureau of Mines and Mineral Resources, Socorro.
C. L. Brierley, and J. A. Brierley.
Canadian Journal of Microbiology, Vol. 19, No. 2, p 183-188, February 1973. 5 fig, 2 tab, 12 ref.

Descriptors: *Thermophilic bacteria, *Electron microscopy, *Pollutant identification, *Biological properties, *Hot springs, *Acidic water, *Isolation, Heat resistance, Respiration, Cytological studies, Temperature, Oxidation.
Identifiers: *Chemoautotrophic bacteria, Bacterial physiology, Sulfolobus, Culture media, Sample preparation, Culturing techniques, Deoxyribonucleic acid, Manometric techniques, Thiobacillus thiooxidans, Bacillus stearothermophilus, Chemical composition, Biochemical tests, Substrate utilization.

A pleomorphic, acidophilic, and chemoautotrophic microbe is described. The cell is bound by a membrane and a diffuse, amorphous layer. The isolate used either sulfur or iron as a source of energy. Morphological and nutritional similarities as well as corresponding thermophilic and acidophilic requirements suggest a relationship to Sulfolobus. The organism tolerates 80 degrees C for longer than 2 hr, but heat resistance is not attributed to a bacterial spore. The maximum temperature for growth is 70 degrees C; the minimum about 45 degrees C. The DNA base composition is 57 plus or minus 3 mole percent GC. Yeast extract enhances growth of the isolate on iron and sulfur substrates, but does not significantly enhance the isolate's respiration rate on these same substrates. The isolate requires induction by sulfur or iron for maximum respiration on these substrates, respectively. Optimum oxidation of elemental sulfur occurred at pH 2.0 and gave a Q sub 02 of 163; oxidation on iron gave a maximum Q sub 02 of 879. (Holoman-Battelle)
W73-08763

RAPID EXTRACTION AND PHYSICAL DETECTION OF POLYOMA VIRUS,

Sherbrooke Univ. (Quebec). Faculte de Medecine.
H. V. Thorne, and A. F. Wardle.
Canadian Journal of Microbiology, Vol. 19, No. 2, p 291-293, February 1973. 2 fig, 5 ref.

Descriptors: *Pollutant identification, *Separation techniques, *Isolation, *Radioactivity techniques, Viruses, Methodology, Enzymes, Radioactivity, Laboratory tests.
Identifiers: *Polyoma virus, Solubilization, Tissue culture, Purification, Sample preparation, Ribonuclease, Deoxyribonuclease.

In the method for the extraction and purification of polyoma virus from mouse embryo cells in tissue culture, monolayer cultures are infected with the virus and incubated at 37 C in Eagle's medium plus 10 percent calf serum containing H-3-thymidine for 5 days in an atmosphere of 5 percent CO2. The cultures are solubilized with Triton-X-100 (20 percent w/v), then treated with RNase, DNase, and trypsin before equilibrium centrifugation in CsCl and collection of the virus band. Analysis of the virus band showed that Triton-X-100 extraction is a satisfactory alternative to earlier procedures for producing virus suspensions suitable for further purification. The total time, including that for purification, is reduced from about 5 days to less than 24 hr. (Holoman-Battelle)
W73-08764

ULTRASTRUCTURE AND CHARACTERIZATION OF AN ASPOROGENIC MUTANT OF CLOSTRIDIUM BOTULINUM TYPE E,

Manitoba Univ., Winnipeg. Dept. of Microbiology.
R. Z. Hawirko, K. L. Chung, A. C. Emeruwa, and A. J. C. Magnusson.
Canadian Journal of Microbiology, Vol. 19, No. 2, p 281-284, February 1973. 14 fig, 2 tab, 15 ref.

Descriptors: *Pollutant identification, *Electron microscopy, Anaerobic bacteria, Coliforms, Enteric bacteria, Genetics.
Identifiers: *Ultrastructure, *Characterization, *Clostridium botulinum type E, *Pathogenicity, *Biochemical characteristics, *Toxigenic bacteria, Mutants, Sample preparation, Culture media, Cell structures.

The asporogenic mutant, RSpoIIIa, showed septum formation and a nearly completed forespore about 4 hr after onset of sporulation. The cells show defects at a few sites of the forespore membrane, an absence of 'germ cell wall', and within 8 hr lysis of the cytoplasm occurred indicating that the mutant was blocked at stage III. Some aberrant envelopes were seen later. Lysis of the asporogenci mutant was inhibited for up to 36 hr by the addition of 2.4 percent glucose or sucrose to the medium, and 80 percent of the cells showed septum formation. A comparison of the phenotypic characteristics of the asporogenic RSpoIIIa and the sporogenic MSp plus mutants, as well as the wild type, showed the same ultrastructural changes during the development of the forespore with the accumulation of intracellular iodophilic granules. In addition, the mutants showed specific immunofluorescence and precipitin lines of identity with antisera against the wild-type strain, but unlike the toxigenic wild type, the mutants were nontoxigenic by mouse pathogenicity tests. (Holoman-Battelle)
W73-08765

CHEMOTAXONOMIC FATTY ACID FINGERPRINTS OF BACTERIA GROWN WITH, AND WITHOUT, AERATION,
Manchester Univ. (England). Dept. of Bacteriology and Virology.
D. B. Drucker, and I. Owen.
Canadian Journal of Microbiology, Vol. 19, No. 2, p 247-250, February 1973. 2 tab, 16 ref.

Descriptors: *Bacteria, *Aeration, *Oxygen, *Gas chromatography, *Pollutant identification, Separation techniques, Chemical analysis, Cultures, Organic acids, Pathogenic bacteria.
Identifiers: *Fatty acids, *Chemotaxonomy, Chemical composition, Retention time, Sample preparation, Bacillus megaterium, Klebsiella aerogenes, Corynebacterium xerosis, Neisseria catarrhalis, Serratia marcescens, Staphylococcus saprophyticus, Streptococcus faecalis, Palmitate, Myristate, Palmitoleate, Oleate, Isopentadecanoate.

Examinations were made of the differences in qualitative and quantitative fatty acid composition between bacterial species and the extent to which such differences are affected by oxygen availability. Fatty acid fingerprints were obtained for Bacillus megaterium, Corynebacterium xerosus, Klebsiella aerogenes, Neisseria catarrhalis, Serratia marcescens, Staphylococcus saprophyticus, and Streptococcus faecalis. The test organisms were grown with, and without, aeration. Freeze-dried cells were methylated and the fatty acid methyl esters examined gas-chromatographically. Fatty acid fingerprints were similar for all the test organisms when grown without aeration and the major fatty acid esters had the retention characteristics of palmitate, then myristate (17.0), palmitoleate (16.4), and oleate (18.4). The cultures grown with aeration showed fairly dissimilar fatty acid fingerprints; the major fatty acid peak having a similar retention time to palmitate (16.0), oleate, isopentadecanoate (14.5), or three unknown fatty acids of carbon numbers 18.25, 18.7, and 19.25, depending on the species tested. (Holoman-Battelle)
W73-08766

EVALUATION OF THE REDESIGNED ENTEROTUBE--A SYSTEM FOR THE IDENTIFICATION OF ENTEROBACTERIACEAE,
Public Health Service, Savannah, Ga. Technical Development Labs.
K. M. Tomfohrde, D. L. Rhoden, P. B. Smith, and A. Balows.
Applied Microbiology, Vol. 25, No. 2, p 301-304, February 1973. 3 tab, 5 ref.

Descriptors: *Pollutant identification, *Laboratory equipment, *Enteric bacteria, *Separation techniques, E. coli, Salmonella, Shigella.
Identifiers: *Enterotube, *Accuracy, Enterobacter hafniae, Citrobacter, Klebsiella, Serratia, Providencia, Proteus mirabilis, Edwardsiella, Enterobacter liquefaciens, Proteus vulgaris, Enterobacter cloacae, Enterobacter aerogenes, Proteus morganii, Proteus rettgeri.

Because of some discrepancies in analytical results, the Enterotube has been redesigned by the manufacturer. A test for ornithine decarboxylase has been added to one compartment, and lactose has been removed from the lysine decarboxylase compartment. The tests for phenylalanine deaminase and dulcitol fermentation have been combined in a single compartment. An iron salt has been added to this same compartment, thus eliminating the need to add ferric chloride reagent in testing for phenylalanine deaminase activity. To improve the decarboxylase reactions and to allow for the observance of gas production from the fermentation of dextrose, the manufacturer covered the compartments containing tests for dextrose fermentation, lysine decarboxylase, and ornithine decarboxylase with a sterile wax overlay. The redesigned Enterotube has been evaluated with 414 unknown Enterobacteriaceae cultures from the stock culture collection of the Center for Disease Control. When the Enterotube was used as recommended by the manufacturer, an average of 96.4 percent of these cultures were correctly identified. Only two groups (Salmonella and Edwardsiella) were identified with less than 90 percent accuracy (89.2 and 87.5 percent, respectively). The Enterotube now provides a convenient, rapid, and accurate test system for the identification of typically reacting enteric bacteria. (Little-Battelle)
W73-08767

AUXOTAB--A DEVICE FOR IDENTIFYING ENTERIC BACTERIA,
Public Health Service, Savannah, Ga. Technical Development Labs.
D. L. Rhoden, K. M. Tomfohrde, P. B. Smith, and A. Balows.
Applied Microbiology, Vol. 25, No. 2, p 284-286, February 1973. 3 tab, 3 ref.

Descriptors: *Poilutant identification, *Enteric bacteria, *Laboratory equipment, *Separation techniques, E. coli, Salmonella, Shigella.
Identifiers: *Auxotab, Enteric I System, *Accuracy, Citrobacter freundii, Klebsiella pneumoniae, Providencia, Proteus vulgaris, Enterobacter hafniae, Edwardsiella tarda, Serratia marcescens, Proteus morganii, Proteus mirabilis, Proteus rettgeri, Arizona hinshawii, Enterobacter cloacae, Enterobacter liquefacians, Enterobacter aerogenes.

A multitest system called the Auxotab that uses ten dehydrated reagents on a paper card has been evaluated with 417 known stock cultures of Enterobacteriaceae. In double-blind studies with the Auxotab, 87 percent of the strains tested were correctly identified. Results indicate that there is a need for modification of the product in regard to ease of handling, time required for use, and accuracy of identification of enteric bacteria. (Little-Battelle)
W73-08768

SPIRAL PLATE METHOD FOR BACTERIAL DETERMINATION,
Food and Drug Administration, Cincinnati, Ohio. Div of Microbiology.
J. E. Gilchrist, J. E. Campbell, C. B. Donnelly, J. T. Peeler, and J. M. Delaney.
Applied Microbiology, Vol. 25, No. 2, p 244-252, February 1973. 5 fig, 4 tab, 14 ref.

Descriptors: *Bacteria, *Laboratory equipment, *Pollutant identification, Cultures, Methodology, E. coli, Pathogenic bacteria, Aerobic bacteria, Automation.
Identifiers: *Enumeration, *Spiral plate method, *Culturing techniques, Bacillus subtilis, Pseudomonas aeruginosa, Staphylococcus aureus, Lactobacillus casei, Culture media.

A method is described for determining the number of bacteria in a solution by the use of a machine which deposits a known volume of sample on a rotating agar plate in an ever decreasing amount in the form of an Archimedes spiral. After the sample is incubated, different colony densities are apparent on the surface of the plate. A modified counting grid is described which relates area of the plate to volume of sample. By counting an appropriate area of the plate, the number of bacteria in the sample is estimated. This method was compared to the pour plate procedure with the use of pure and mixed cultures in water and milk. The results did not demonstrate a significant difference in variance between duplicates at the alpha equals 0.01 level when concentrations of 600 to 1,200,000 bacteria per ml were used, but the spiral plate method gave counts that were higher than counts obtained by the pour plate method. The time and materials required for this method are substantially less than those required for the conventional aerobic pour plate procedure. (Holoman-Battelle)
W73-08769

APPLICATION OF THE MOST-PROBABLE-NUMBER PROCEDURE TO SUSPENSIONS OF LEPTOSPIRA AUTUMNALIS AKIYAMI A,
North Carolina Univ., Chapel Hill. Dept. of Environmental Sciences and Engineering.
D. A. Schiemann.
Applied Microbiology, Vol. 25, No. 2, p 235-239, February 1973. 2 fig, 4 tab, 7 ref.

Descriptors: *Population, *Statistical methods, *Estimating, Bacteria, Density, Pathogenic bacteria.
Identifiers: *Most Probable Number test, *Leptospira autumnalis.

Suspensions of washed cells of Leptospira autumnalis Akiyami A were diluted and used to inoculate three series of 120 tubes for use in determining the reliability of the most-probable-number (MPN) procedure for estimating the density of the bacteria. Statistical tests demonstrated that with supplemented Fletchers medium used for cell recovery, the MPN procedure is a reliable technique for estimating the density of suspensions of L. autumnalis. (Little-Battelle)
W73-08770

IN-USE EVALUATION OF A COMMERCIALLY AVAILABLE SET OF QUALITY CONTROL CULTURES,
Public Health Service, Savannah, Ga. Technical Development Labs.
G. W. Douglas, A. Balows, D. Rhoden, K. Tomfohrde, and P. B. Smith.
Applied Microbiology, Vol 25, No 2, p 230-234, February 1973. 6 tab, 14 ref.

Descriptors: *Cultures, *Pathogenic bacteria, E. coli, Enteric bacteria.
Identifiers: *Quality control, *Culture media, *Bact-Chek, *Evaluation, Enterobacter cloacae, Proteus vulgaris, Pseudomonas aeruginosa, Salmonella typhimurium, Staphylococcus aureus, Staphylococcus epidermis, Streptococcus pyogenes.

Increasing awareness of the need for a uniform quality control program prompted an evaluation of a commercially available set (Bact-Chek) of eight organisms. A protocol was designed in which this

set of control cultures was tested simultaneously in the clinical microbiology laboratory of a 400-bed hospital (the Berkshire Medical Center) and in the reference laboratories of the Bacteriology Section of the Center for Disease Control. The results indicate that the Bact-Chek organisms are essentially as advertised: they constitute a basic set of cultures for a quality control program in clinical microbiology. Ninety percent of the media and reagents (excluding myobacterial media and reagents) in the clinical laboratory were checked with this set of eight cultures. Additional cultures not in the set were used to check the remaining 10 percent of the media and reagents. (Little-Battelle)
W73-08771

CULTURED RED ALGA TO MEASURE POLLUTION,
Durham Univ. (England). Dept. of Botany.
P. Edwards.
Marine Pollution Bulletin, Vol 3, No 12, p 184-188, December 1972. 5 fig, 14 ref.

Descriptors: *Cultures, *Bioassay, *Bioindicators, *Growth rates, *Nitrates, *Phosphates, *Sea water, Copper, Rhodophyta, Eutrophication, Water pollution effects.
Identifiers: *Callithamnion hookeri, Culture media, Enrichment.

Because of its small size, simple structure, and rapid growth rate, the red alga, Callithamnion hookeri, was cultured to assess its potential as a bionindicator in the marine environment. The ability of the alga to detect eutrophication was investigated by determining the effect of nutrients on growth rates. The effect of copper was also studied. The algae were cultured at 14.5 C in Ehrlenmeyer flasks containing relatively unpolluted seawater whcih was inoculated with seawater from seven stations, nitrate, phosphate, or CuC12. The alga grew equally well in seawater samples from unpolluted and polluted localities. The species was insensitive to nitrate and phosphate levels of the medium and thus cannot be used as an indicator of eutrophication. Relatively small copper concentrations depressed the growth of the species. No difference in copper tolerance was demonstrated between isolates from unpolluted north-east Scotland and polluted Coutny Durham, but the isolate from unpolluted south-west England was apparently less resistant to copper. (Little-Battelle)
W73-08772

SEPARATION OF POLYAROMATIC HYDROCARBONS BU LIQUID-SOLID CHROMATOGRAPHY USING 2,4,7--TRINITROFLUORENONE IMPREGNATED CORASIL I COLUMNS,
Ecole Polytechnique, Paris (France). Laboratoire de Chimie Analytique Physique.
B. L. Karger, M. Martin, J. Loheac, and G. Guiochon.
Analytical Chemistry, Vol 45, No 3, p 496-500, March 1973. 4 fig, 4 tab, 16 ref.

Descriptors: *Chemical analysis, *Separation techniques, *Pollutant identification, Organic compounds, Aromatic compounds, Methodology, Temperature.
Identifiers: *Aromatic hydrocarbons, *Liquid solid chromatography, 2 4 7-trinitrofluorene, Corasil I, Retention time, Chromatography columns, Charge transfer, Adsorbents, Isomers, Anthracene, Pyrene, Chrysene, 3 4-benzpyrene, 1 2 3 4-dibenzanthracene, 1 2 3 4-dibenzpyrene, 3 4 8 9-dibenzpyrene.

The purpose was to illustrate the combination of selective separations via charge transfer complexation with the speed and efficiency possible from porous layer beads (PLB). In connection with such an illustration, the use of trinitrofluorene (TNF) impregnated Corasil I columns was investigated. A technical problem encountered involved the shifting of maximum absorbance in the UV region to longer wavelengths as the number of fused aromatic rings increased. However, by adjusting the percent of TNF, mobile phase water content, and temperature, it was possible to optimize the column for rapid analysis for the separation of 3-, 4-, 5-, 6- or even 7-fused ring polyaromatic systems. The Corasil I porous layer beads used as support contributed partly to the retention. This effect was markedly reduced by using water saturated heptane as the mobile phase. (Holoman-Battelle)
W73-08773

THE ANALYSIS OF DESIGNED EXPERIMENTS WITH CENSORED OBSERVATIONS,
Unilever Ltd., Sharnbrook (England). Unilever Research Lab.
For primary bibliographic entry see Field 07B.
W73-08777

THE BACTERIA IN AN ANTARTIC PEAT,
University Coll., London (England). Dept. of Botany.
J. H. Baker, and D. G. Smith.
Journal of Applied Bacteriology, Vol 35, No 4, p 589-596, December 1972. 1 tab, 45 ref.

Descriptors: *Peat, *Anarctic, *Pollutant identification, *Separation techniques, *Cultures, *Bacteria, Isolation.
Identifiers: *Sample preparation, Brevibacterium, Arthrobacter, Cellulomonas, Kurthia, Micrococcus, Bacillus, Microbacterium, Sarcina, Flavobacterium, Achromobacter, Alcaligenes, Agrobacterium, Acinetobacter, Corynebacterium, Agars.

Peat samples were collected from 3 depths on the west coast of Signy Island, South Orkney and prepared for analysis by homogenizing, diluting with distilled water, and dropping on to plates of Oxoid Tryptone-Soya Agar. The characters used for identification of the bacteria were: Gram reaction, morphology of old and young cells, pigmentation, motility, position of flagella, endospore formation, action on litmus milk, nitrate reduction, utilization of cellulose, gelatin, starch, chitin, alginate, phenol, alkylamine and alcohol, and fermentation of glucose and lactose. Of a total of 119 strains of bacteria 52 percent belonged to the genus Brevibacterium. Twelve other genera were recorded of which numerically the most important were Arthrobacter, Cellulomonas, Kurthia and Micrococcus. 62 percent of the collection were psychrophilic, but only 4 strains were obligate psychrophiles. No pattern could be established for the various genera from different depths. The fine structure of an obligately psychrophilic pleomorphic rod from the peat is illustrated and discussed. (Little-Battelle)
W73-08778

DETERMINATION OF SOME CARBAMATES BY ENZYME INHIBITION TECHNIQUES USING THIN-LAYER CHROMATOGRAPHY AND COLORIMETRY,
C. E. Mendoza, and J. B. Shields.
Journal of Agricultural and Food Chemistry, Vol 21, No 2, p 178-184, March/April 1973. 5 fig, 7 tab, 22 ref.

Descriptors: *Bioassay, *Pollutant identification, *Carbamate pesticides, *Pesticide residues, *Colorimetry, *Pesticide toxicity, Thiocarbamate pesticides, Spectrophotometry, Bromine, Pollutants, Insecticides, Ultraviolet radiation, Methodology, Chemical analysis.
Identifiers: *Thin layer chromatography, *Tlc-enzyme inhibition techniques, Substrates, Aldicarb, Butacarb, c-8353, Carbaryl, Indophenyl acetate, Formetanate (HCl), Meobal, Mesurol, Methomyl, Promecarb, Enzyme inhibitors, Chemical interference, Detection limits, 5-Bromoindoxyl acetate, Porcine liver esterases.

Detection limits were determined by a thin-layer chromatographic-enzyme inhibition technique for aldicarb, Butacarb, c-8353, carbaryl, formetanate (HCl), Meobal, Mesurol, methomyl, and promecarb. Indophenyl and 5-bromoindoxyl acetates were used as substrates of porcine liver esterases. Effects of ultraviolet irradiation and bromine on the pesticides were also studied. Inhibition of esterase activities by these carbamates was determined by spectrophotometry using indophenyl acetate (IPA) substrate. Percent inhibitions were based on IPA hydrolysis rate in the treated solutions at two different periods vs. that in the control enzyme solutions, and the absorbance of the treated solution at 7.5 or 15 min after the addition of substrate vs. the absorbance of the control solution. The results indicate that tlc and colorimetry using IPA are complimentary techniques, and that the same enzyme sites or system are involved. Both techniques can be used to confirm pesticide residues that are enzyme inhibitors. The data also suggested that Butacarb, promecarb, Mesurol, and carbaryl can be classified as strong inhibitors, and aldicarb and formetanate (HCl) can be classified as weak inhibitors of pig liver esterases catalyzing the hydrolysis of IPA. Since the colorimetric procedure used includes incubation of pesticides before the addition of substrates, it can be used directly to assay enzyme activities from insecticide-treated organisms. IPA, as a substrate, can be used in tlc and colorimetry without involving complex preparations. IPA solution is stable, particularly when stored at 4 degrees. (Holoman-Battelle)
W73-08779

THE DETERMINATION OF ORGANOCARBON IN CLAY MATERIALS,
English Clays Lovering Pochin and Co. Ltd., St. Austell (Enland). Central Labs.
A. P. Ferris, and W. B. Jepson.
Analyst, Vol 97, No 1161, p 940-950, December 1972. 6 fig, 42 ref.

Descriptors: *Clays, *Chemical analysis, *Methodology, *Soil analysis, *Laboratory equipment, Kaolinite, Storage.
Identifiers: *Organic carbon, Kaolin, Dry ashing, Chemical interference, Sulfur dioxide, Silicon tetrafluoride, Hydrogen fluoride, Wet ashing, Precision.

A dry-combustion method is described for the determination of organocarbon in clay materials. The essential features are the use of purified oxygen; slow insertion of the sample into the furnace to avoid rapid dehydroxylation of the kaolinite and attendant loss of pyrolysis fragments in the atmosphere of steam that is generated; and the use of traps to remove gaseous fluorine compounds, steam and sulphur dioxide. Extensive tests on the apparatus with calcium carbonate and with mixtrues of kaolin with glucose and with tannic acid are described. Tests with a commercial kaolin containing organic matter equivalent to about 550 micrograms of carbon per gram of material indicated a standard error of 8 micrograms, or plus or minus 1.5 per cent. A published method in which the kaolin is heated in a stream of oxygen containing 2 per cent V/V of ozone has been re-investigated; the organocarbon was only partially oxidized so that the method has no analytical value. Two wet-combustion methods involving the separate use of potassium dichromate and potassium persulphate, which are used in soil analysis, were evaluated. The organic matter on the clay was again only partially oxidized to carbon dioxide under the experimental conditions. (Holoman-Battelle)
W73-08780

THE ANALYSIS OF ORGANICALLY BOUND ELEMENTS (AS, SE, BR) AND PHOSPHORUS IN RAW, REFINED, BLEACHED AND

HYDROGENATED MARINE OILS PRODUCED FROM FISH OF DIFFERENT QUALITY,
Central Inst. for Industrial Research, Oslo (Norway).
G. Lunde.
Journal of the American Oil Chemists Society, Vol 50, No 1, p 26-28, January 1973. 2 tab, 5 ref.

Descriptors: *Neutron activation analysis, *Biomass, *Phosphorus, Storage.
Identifiers: *Fish oil, *Arsenic, *Selenium, Bleaching, Oil refining, Hydrogenation, Oil characterization, Spoilage, *Marine oils.

The purpose was to study how the selenium, arsenic, phosphorus, and bromine contents varied in oils produced from raw fish materials of differing quality and to follow these elements in the oils during the alkaline-refining, the bleaching, and the hydrogenation processes. Herring, mackerel, and capelin oils, were produced from raw materials stored for varying lengths of time and consequently were of varying quality. Neutron activation analysis of samples showed that when the raw material deteriorates during storage, an increase in the selenium and phosphorus content in the oils produced from these materials is observed, whereas the bromine and the arsenic content is nearly constant. During the refining the arsenic and phosphorus disappear almost completely from the oils, whereas the selenium content is reduced to about two-thirds and the bromine content is nearly unaffected. In the hydrogenation step the selenium disappears relatively fast and the bromine more slowly. (Little-Battelle)
W73-08781

REVERSED-PHASE FOAM CHROMATOGRAPHY. REDOX REACTIONS ON OPEN-CELL POLYURETHANE FOAM COLUMNS SUPPORTING TETRACHLOROHYDROQUINONE,
Eotvos Lorand Univ., Budapest (Hungary). Inst. of Inorganic and Analytical Chemistry.
T. Braun, A. B. Farag, and A. Klimes-Szmik.
Analytica Chimica Acta, Vol 64, No 1, p 71-76, March 1973. 2 fig, 1 tab, 5 ref.

Descriptors: *Chemical reactions, *Heavy metals, *Pollutant identification, Iron, Cations, Temperature, Flow rates, Reduction (Chemical), Oxidation.
Identifiers: *Reversed phase foam chromatography, *Open cell polyurethane foam, *Support columns, *Chloranil, Polyurethane foams, Cerium, Vanadium, Tetrachlorohydroquinone.

The use of elastic polyurethane foam as a support for chloranil in reversed-phase foam chromatography was proved successful. Reductions of cerium (IV), vanadium (V) and iron (II) on foam-filled columns were carried out quantitatively and rapidly. The effect of flow-rate and temperature on the reduction of each metal ion was examined in detail. Cerium (IV) was reduced quantitatively on passing through the foam-redox column at flow-rates of 2-11 ml/min at room temperature. The reduction of vanadium (V) and iron (III) was slower; complete reduction occurred only at flow-rates up to 4 and 2 ml/min for V (V) and Fe (III), respectively. At 35 degrees, however, it was possible to use flow-rates of 7 and 6 ml/min for the quantitative reduction of V (V) and Fe (III) respectively. (Holoman-Battelle)
W73-08782

ION-EXCHANGE FOAM CHROMATOGRAPHY. PART I. PREPARATION OF RIGID AND FLEXIBLE ION-EXCHANGE FOAMS,
Eotvos Lorand Univ., Budapest (Hungary). Inst. of Inorganic and Analytical Chemistry.
For primary bibliographic entry see Field 02K.
W73-08783

ION EXCHANGE IN AQUEOUS AND IN AQUEOUS-ORGANIC SOLVENTS. PART I. ANION-EXCHANGE BEHAVIOUR OF ZR, NB, TA AND PA IN AQUEOUS HCL-HF AND IN HCL-H-F-ORGANIC SOLVENT,
Technische Universitaet, Munich (West Germany). Institut fuer Radiochemie.
J. I. Kim, H. Lagally, and H-J. Born.
Analytica Chimica Acta, Vol 64, No 1, p 29-43, March 1973. 9 fig, 20 ref.

Descriptors: *Anion exchange, *Radioactivity techniques, Adsorption, Separation techniques, Aqueous solutions, Pollutant identification, Heavy metals.
Identifiers: *Aqueous solvents, *Organic solvents, *Zirconium, *Niobium, *Protactinium, *Tantalum, Ion exchange resins, Gamma spectrometry, Pa-233, zr-95, Nb-95, Ta-182, Pa-231, Hydrochloric acid, Hydrofluoric acid, Acetic acid, Isopropanol, Methanol, Protactinium radioisotopes, Tantalum radioisotopes, Niobium radioisotopes, Zirconium radioisotopes.

Ion-exchange behaviors of Zr (IV, Nb (V), Ta (V), and Pa (V) on the anion exchanger Dowex 1-x8 were investigated first in a wide variety of aqueous mixed hydrochloric acid-hydrofluoric acid and secondly in the same aqueous system mixed with various organic solvents. Equilibrium adsorptions of these four elements as a function of hydrochloric acid concentration as well as hydrofluoric acid concentration, or both acid concentrations, were strongly differentiated. This fact can be utilized for convenient separations of these elements from each other. Based on the equilibrium results, the possible complex formation of the metal ions and the separation possibilities for the elements are discussed. (Holoman-Battelle)
W73-08784

THE SIMULTANEOUS DETERMINATION OF TRACES OF COBALT, CHROMIUM, COPPER, IRON, MANGANESE AND ZINC BY ATOMIC FLUORESCENCE SPECTROMETRY WITH PRECONCENTRATION BY AN AUTOMATED SOLVENT EXTRACTION PROCEDURE,
Imperial Coll. of Science and Technology, London (England). Dept. of Chemistry.
M. Jones, G. F. Kirkbright, L. Ranson, and T. S. West.
Analytica Chimica Acta, Vol 63, No 1, p 210-215, January 1973. 2 fig, 2 tab, 11 ref.

Descriptors: *Heavy metals, *Aqueous solutions, *Chemical analysis, *Pollutant identification, Water analysis, Solvent extractions, Trace elements, Cobalt, Chromium, Copper, Iron, Manganese, Zinc, Sea water, Automation, Methodology, Efficiencies, Separation techniques.
Identifiers: *Sample preparation, Preconcentration, *Automated solvent extraction, *Atomic fluorescence spectroscopy, *Multielemental analysis, Detection limits, Recovery, Accuracy, Organic solvents.

A description is given of the assembly and operation of an automated solvent extraction system for preconcentration; the subsequent simultaneous determination of Co, Cr, Cu, Fe, Mn and Zn by atomic fluorescence spectrometry in a manner similar to that described elsewhere is also reported. The application of this system to the rapid determination of trace amounts of Cu, Fe, Mn and Zn in sea-water is also described. Detection limits and extraction efficiencies were obtained for all 6 elements in aqueous and organic solutions. Except for chromium, an improvement of 6-10-fold in the detection limit was achieved by the extraction procedure. The analysis rate of the spectrometer is limited by the rate of the automated solvent extraction process; under the conditions used the maximum analysis rate was 25 samples per h. Recovery of the analyte elements from the sea water samples was checked by making standard additions of each of the elements to an analyzed sample; recoveries exceeded 90 percent, indicating that the accuracy sufficed for the routine determination of these metals (less than ca. 0.1 ppm) in sea water. The automated solvent extraction method developed can be successfully employed for simultaneous determinations of six elements with a multichannel atomic fluorescence spectrometer. Improved detection limits are obtained, but only a 4:1 sample:solvent mixing ratio is tolerable if the system is to be successfully interfaced with the nebulizer of the flame spectrometer. (Holoman-Battelle)
W73-08785

DETERMINATION OF CHLOROPHYLL A AND B IN PLANT EXTRACTS BY COMBINED SUCROSE THIN-LAYER CHROMATOGRAPHY AND ATOMIC ABSORPTION SPECTROPHOTOMETRY,
Texas Tech Univ., Lubbock. Textile Research Center.
For primary bibliographic entry see Field 02K.
W73-08786

THE PREPARATION AND ANALYTICAL EVALUATION OF A NEW HETEROGENEOUS MEMBRANE ELECTRODE FOR CADMIUM (II),
Rome Univ. (Italy). Istituto di Chimica Analitica.
M. Mascini, and A. Liberti.
Analytica Chimica Acta, Vol 64, No 1, p 63-70, March 1973. 7 fig, 1 tab, 7 ref.

Descriptors: *Calibrations, *Aqueous solutions, *Hydrogen ion concentration, *Cadmium, Design, Silver, Mercury, Copper, Lead, Zinc, Cobalt, Nickel, Iron.
Identifiers: *Ion selective electrodes, *Detection limits, Sensitivity, *Chemical interfere.

A new heterogeneous membrane electrode for cadmium ion was prepared by thermomoulding mixtures of cadmium and silver sulfides and polyethylene. Electrodes were prepared with eight different salt preparations. Calibrations were obtained with pure cadmium nitrate solutions and with sodium nitrate additions to the solutions. Only electrodes prepared using Ag2S-CdS mixtures precipitated from acidic solutions with hydrogen sulfide and heat treated exhibited Nerstian behavior. This method of preparation, therefore, was chosen. The electrodes prepared in this manner responded linearly down to 0.00001 M Ca (2 plus) and indicated changes in concentrations down to 0.0000001 M. The effects of mixed solvents, pH variations, and interference from Ag, Hg, Cu, H, Pb, Zn, Co, Ni, and Fe were also investigated. The electrode was shown to be useful in both aqueous and nonaqueous solutions. (Little-Battelle)
W73-08787

GRAPHITE ROD ATOMIZATION AND ATOMIC FLUORESCENCE FOR THE SIMULTANEOUS DETERMINATION OF SILVER AND COPPER IN JET ENGINE OILS,
Florida Univ., Gainesville. Dept. of Chemistry.
B. M. Patel, and J. D. Winefordner.
Analytica Chimica Acta, Vol 64, No 1, p 135-138, March 1973. 2 fig, 1 tab, 9 ref.

Descriptors: *Copper, *Chemical analysis, *Methodology, Heavy metals, Oil, Pollutant identification.
Identifiers: *Atomic fluorescence spectroscopy, *Silver, *Jet engine oil, Spectrochemical Oil Analysis Program, Fluorescent spectra, Accuracy.

Silver and copper can be determined simultaneously by atomic fluorescence without altering any conditions for sample atomization. Both of the elements are atomized simultaneously from a heated graphite rod at an intermediate temperature (1800 K), and the two separate fluorescence peaks

result. This procedure has been applied to the analysis of used jet engine oils using 0.5-microliter samples. The samples were ashed at 42 A (645 K) for 18 s. Silver and copper were simultaneously atomized by suddenly increasing the current to 98 A for 3 s to give a temperature of about 1800 K. The resulting atoms produced two resolved atomic fluorescence peaks. An atmosphere of argon and hydrogen (with flow rates 6.4 1/min and 1.2 1/min, respectively) was maintained around the graphite rod atomizer. The results for Ag and Cu in the oil samples, determined by atomic fluorescence, were compared with the mean values from the U.S. Air Force S.O.A.P. (Supplier of the samples analyzed) laboratories by emission and flame atomic absorption methods. There was reasonable agreement among the values, and the results from the simultaneous atomization technique usually fell within the standard deviations of the results from the S.O.A.P. laboratories. The relative standard deviations calculated from 10-15 determinations for different oil samples by this technique were between 6 and 12 percent. The slight loss in precision is compensated by the saving in time achieved. (Holoman-Battelle)
W73-08788

SEPARATION OF MATRIX ABSORPTION AND ENHANCEMENT EFFECTS IN THE DETERMINATION OF SULFUR IN SEA WATER BY X--RAY FLUORESCENCE,
Hawaii Univ., Honolulu. Dept. of Chemistry; and Hawaii Inst. of Geophysics, Honolulu.
H. Zeitlin.
Analytica Chimica Acta, Vol 64, No 1, p 139-142, March 1973. 1 fig, 2 tab, 6 ref.

Descriptors: *Sea water, *X-ray fluorescence, *Sulfur, Chemical analysis, X-ray analysis, Separation techniques, Sodium, Chlorine, Radiation.
Identifiers: *Matrix effects, Matrix absorption, Chemical interference.

An investigation has been made of the relationship between matrix absorption and enhancement effects as observed in the determination of sulfur in sea water. Standard sulfate solutions were prepared from lithium sulfate monohydrate and sodium and chlorine were added as matrix variants in various forms. The intensity of SK sub alpha fluorescence (I sub F) at a wavelength of 5.372 A as well as the intensity of scattered bremsstrahlung (I sub SR) at 5.299 A were measured by X-ray fluorescence. The scattered radiation method with soft scattered bremsstrahlung affords only slight compensation for matrix effects in X-ray analysis for sulfur in sea water. However, the technique offers an effective means by which the effects of instrumental variations and sample inhomogeneities may be diminished. (Holoman-Battelle)
W73-08789

A RADIOREAGENT METHOD FOR THE DETERMINATION OF TRACES OF BISMUTH,
Savannah State Coll., Ga. Dept. of Chemistry.
M. P. Menon.
Analytica Chimica Acta, Vol 64, No 1, p 151-155, March 1973. 4 tab, 9 ref.

Descriptors: *Radioactivity techniques, *Iodine radioisotopes, *Chemical reactions, Heavy metals, Aqueous solutions, Methodology, Chemical analysis, Radioactivity, Solvent extractions, Iron, Chromium, Cadmium, Copper, Mercury, Nickel, Lead, Pollutant identification.
Identifiers: *Bismuth, *Trace levels, Tetraiodobismuthic acid, Chemical interference, Silver, Antimony, Vanadium.

A method has been described for the determination of traces of bismuth in aqueous solutions with radioiodide. It makes use of the reaction between soluble iodide and an acidic solution of Bi to convert Bi ion to radioactive tetraiodobismuthic acid by treatment with excess of I-131. The active product is extracted into n-butyl acetate and the gamma-ray activity of a portion of the extract is determined. The relationship between the net activity of the reaction product and the concentration of bismuth was linear over the range 1-25 micrograms of bismuth. The sensitivity of the proposed method appears to be better than that of any other method except the dithizone method, which has been applied only to biomaterials. Elements such as Cd, Pb, Cu, Ag, Hg, Sv and V interfere with the direct determination of bismuth, but bismuth can still be determined directly in solutions containing iron, nickel, or chromium, or in most biological samples. The results of the analyses of the N.B.S. reference standards with the preliminary extraction were in fairly good agreement with the values certified by N.B.S. (Holoman-Battelle)
W73-08790

A TECHNIQUE FOR FAST AND REPRODUCIBLE FINGERPRINTING OF BACTERIA BY PYROLYSIS MASS SPECTROMETRY,
Stichting voor Fundamenteel Onderzoek der Materie, Amsterdam (Netherlands). Instituut voor Atoom en Molecuulfysica.
H. L. C. Meuzelaar, and P. G. Kistemaker.
Analytical Chemistry, Vol 45, No 3, p 587-590, March 1973. 4 fig, 1 tab, 22 ref.

Descriptors: *Bacteria, Mass spectrometry, Pathogenic bacteria, Laboratory equipment, Pollutant identification.
Identifiers: *Pyrolysis mass spectrometry, *Sample preparation, *Freeze drying, *Characterization, Neisseria sicca, Leptospira, Neisseria meningitides, Biological samples, Mass spectra.

Neisseria sicca, N. meningitides and Leptospira strains were cultured, washed in isotonic salt solutions, centrifuged, resuspended in distilled water, and freeze-dried for analysis by pyrolysis mass spectrometry. The freeze-dried samples were suspended in carbon disulfide and small drops applied to the ferromagnetic Curie-point pyrolysis wires which were rotated to evenly distribute the sample. The mass spectrometer used was a fast scanning quadrupole mass filter with a multi-channel signal averager for recording the spectra. The pyrolysis wires operated at 510 C, and mass spectra were obtained by the accumulation of 70 scans of 0.5 sec duration. Although the results are preliminary, the method proved to be rapid, reproducible, and able to differentiate the three bacteria. Work is being continued using low-voltage, electron-impact ionization. (Little-Battelle)
W73-08792

SPECTROPHOTOMETRIC DETERMINATION OF P.P.B. LEVELS OF LONG-CHAIN AMINES IN WATERS AND RAFFINATES,
Australian Atomic Energy Commission Research Establishment, Lucas Heights.
T. M. Florence, and Y. J. Farrar.
Analytica Chimica Acta, Vol 63, No 2, p 255-261, February 1973. 3 fig, 2 tab, 3 ref.

Descriptors: *Chemical analysis, *Water analysis, *Spectrophotometry, *Methodology, Pollutant identification, Rivers, Sea water, Solvent extractions, Industrial wastes, Organic compounds, Separation techniques, Chlorides, Anions, Cations, Copper, Iron, Magnesium, Heavy metals, Chromium, Zinc, Manganese, Nickel, Nitrates, Phosphates, Freshwater, Nitrogen compounds, Water sampling, Equipment, Storage.
Identifiers: *Uranium processing raffinates, *Aliphatic amines, *Alamine 336, Ionic interference, Detection limits, Accuracy, Precision, Aliquat 336, Primene JM-T, Amberlite LA-1, Uranium, Absorbance, Trace levels, Organic solvents.

A method has been developed for the determination of traces of long-chain amines in river and sea water and uranium processing raffinates. The amine is extracted as an ion-association complex with chromate from sulfuric acid solution into chloroform and the extracted Cr (VI) is determined spectrophotometrically with diphenylcarbazide. Alamine 336, a mixture of tri-n-octyl and tri-n-decylamines, was studied using this method. Tests for adsorption losses showed that polyethylene containers are unsuitable for collection or storage but glass containers are safe for up to a week. Several metal ions (Cu (II), Fe (III), Mg (II), Mn (II), Ni (II), U (VI) and Zn (II)) were found to have no effect on the determination of Alamine 336 by the chromate method, even when present at 500 times the amine concentration. Chloride, nitrate, and phosphate at concentrations of 25, 5, and 250 ppm, respectively, could be tolerated in determining 1 ppm Alamine 336 by a single chromate extraction. The limits of detection for Alamine 336 with a 100-ml and a 250-ml sample were 15 and 7 ppb, respectively. The relative standard deviation of the method at 1.5 ppm Alamine 336 level was 1.9 percent. The application of the chromate method to the determination of some other commercial amines (Aliquat 336, Primene JM-T, Amberlite LA-1) indicates that primary, secondary, and quatenary long-chain amines can also be determined. (Holoman-Battelle)
W73-08793

TRACE DETERMINATION OF MERCURY IN BIOLOGICAL MATERIALS BY FLAMELESS ATOMIC ABSORPTION SPECTROMETRY,
Central Inst. for Industrial Research, Oslo (Norway).
S. H. Omang.
Analytica Chimica Acta, Vol 63, No 2, p 247-253, February 1973. 3 tab, 17 ref.

Descriptors: *Mercury, *Chemical analysis, *Methodology, Heavy metals, Iodides, Bromides, Anions, Pollutant identification.
Identifiers: *Sample preparation, *Wet ashing, *Biological samples, Flameless atomic absorption spectrophotometry, Chemical interference, Trace levels.

A new, rapid, wet digestion procedure which utilizes a mixture of hydrobromic acid and nitric acid has been used for preparing biological materials for analysis for the presence of mercury. The samples are boiled for 5-10 min in a mixture of nitric and hydrobromic acid under reflux. Mercury is then determined by the flameless cold-vapor, atomic absorption technique and complete release is shown to occur even when the fat present is not fully decomposed. The results are discussed with regard to the normal bromine and iodine content of marine samples. The enhancement obtained with bromine can easily be compensated by digesting the standards. Iodine, however, reduces the peak heights and the content of this element must be judged separately for samples other than fish, which can always be safety analyzed without interference. (Holoman-Battelle)
W73-08794

AN AIR-LIFT FOR SAMPLING FRESHWATER BENTHOS,
Reading Univ. (England). Dept. of Zoology.
For primary bibliographic entry see Field 07B.
W73-08795

COMPARATIVE HABITAT DIVERSITY AND FAUNAL RELATIONSHIPS BETWEEN THE PACIFIC AND CARIBBEAN DECAPOD CRUSTACEA OF PANAMA,
Miami Univ., Fla.
L. G. Abele.
Availale from Univ. Microfilms, Inc., Ann Arbor, Mich. 48106 Order No. 73-5817. Ph D Dissertation, 1972, 124 p.

Descriptors: *Distribution patterns, *Habitats, Beaches, *Mangrove swamps, *Dominant organisms, Biological communities, Pacific Ocean, Sampling, Population, Benthic fauna, Sands, Muds, Rocks, Crustaceans.
Identifiers: *Species diversity, *Decapods, Caribbean Sea, Substrates, *Panama.

The community structure of the decapod crustacean fauna of seven tropical, shallow water, marine habitats was examined. Sandy beaches, mangrove swamps and rocky intertidal habitats on both the Pacific and Caribbean coasts of Panama were sampled. The Pocillopora coral habitat of the Bay of Panama was also sampled. The species composition and their relative abundances were noted for each habitat. Four thousand three hundred and seventy-two specimens representing 247 species were collected from the seven habitats. An index of faunal similarity was calculated for each pair (Pacific-Caribbean) of habitats. This is the number of ecologically and taxonomically similar species which occurred in both habitats expressed as a percentage of the total number of species present in pair of habitats. A few specialized species dominated each of the communities. It is demonstrated that the number of species present in a habitat increases as the structural complexity of the habitat increases. Structural complexity of the habitats was approximated by the number of different types of substrates present. (Little-Battelle)
W73-08796

SIMPLE METHOD FOR CULTURING ANAEROBES,
California Univ., San Diego, La Jolla. Clinical Microbiology Lab.
C. E. Davis, W. J. Hunter, J. L. Ryan, and A. I. Braude.
Applied Microbiology, Vol 25, No 2, p 216-221, February 1973. 1 fig, 2 tab, 14 ref.

Descriptors: *Anaerobic bacteria, *Methodology, *Pathogenic bacteria, *Pollutant identification, Laboratory tests, Water pollution sources, Enteric bacteria, Isolation.
Identifiers: *Culturing techniques, *Selective media, Culture media, Pathogenicity, Actinomyces spp, Vibrio sputorum, Propionobacterium, Fusobacterium spp, Peptococcus, Sarcina, Catenabacterium spp, Streptococcus spp, Ramibacterium spp, Bacteroides spp, Gentamicin sulfate, Lactobacillus, Veillonella, Corynebacteria, Sphaerophorus necrophorus, Clostridium spp, Gaffkya anaerobia, Eubacterium spp.

A simple, effective method is needed for growing obligate anaerobes in the clinical laboratory. A pre-reduced anaerobic bottle is described that can be used for direct inoculation, provides a flat agar surface for evaluation of number and morphology of colonies, and can be incubated in conventional bacteriological incubators. Its efficiency was evaluated by testing it on a routine basis in the clinical laboratory by three criteria: (i) recovery of bacteria that did not grow aerobically but were observed in Gram stains; (ii) isolation of a wide range of pathogenic anaerobic bacteria; and (iii) comparison to a GasPak jar closed immediately after the inoculation of a single specimen and not opened for 48 hr. Each anaerobic culture set consisted of two bottles containing brain heart infusion agar and CO2. Gentamicin sulfate (50 micrograms/ml) was added to one of these to inhibit facultative enteric bacilli. Comparison of the anaerobic bottles with an identical aerobic bottle which was also routinely inoculated permitted early identification of anaerobic colonies. Representative species of most anaerobic genera of proven pathogenicity for man have been isolated from this system during 10 months of routine use. (Holoman-Battelle)
W73-08798

FLUORESCENT ANTIBODY AS A METHOD FOR THE DETECTION OF FECAL POLLUTION: ESCHERICHIA COLI AS INDICATOR ORGANISMS,
North Texas State Univ., Denton. Dept. of Biology.
R. L. Abshire, and R. K. Guthrie.
Canadian Journal of Microbiology, Vol 19, No 2, p 201-206, February 1973. 6 tab, 23 ref.

Descriptors: *E. coli, *Bioindicators, *Pollutant identification, Methodology, Water pollution, Enteric bacteria, Reliability, Waste water (Pollution), Water pollution sources, Water quality, Aerobic bacteria, Pathogenic bacteria.
Identifiers: *Fecal pollution, *Fluorescent antibody techniques, Fecal coliforms, Culture media, Sample preparation, Heterologous bacteria, Biochemical tests, Fluorescent microscopy, Aerobacter aerogenes, Klebsiella pneumoniae, Arizona arizonae, Salmonella spp, Shigella spp, Proteus vulgaris, Pseudomonas aeruginosa, Alicalgenes faecalis, Providencia, Staphylococeus aureus, Streptococcus faecalis, Serratia marcescens, Streptococcus pyogenes.

A study was made to determine whether fluorescent antibody (FA) techniques, with E. coli as an indicator organism, offer a potential as a tool for the very rapid detection of fecal pollution in water. Detection of Escherichia coli of fecal origin by this method was compared to IMVIC typing and to detection by the E C Broth method. Reliability of this method was tested by reaction of specific E. coli antisera with heterologous bacterial species and with isolates from polluted waste water and unpolluted water and soil sources. There was no attempt to detect individual strains or to differentiate between pathogenic and non-pathogenic strains. Detection of E. coli was possible by this method in 2 to 3 hr after filtration of a sample of wastewater effluent and placing the filter in lactose broth at 37 degrees C. (Holoman-Battelle)
W73-08799

SELECTRODE (TM)--THE UNIVERSAL ION--SELECTIVE ELECTRODE. PART IV. THE SOLID-STATE CADMIUM (II) SELECTRODE IN EDTA TITRATIONS AND CADMIUM BUFFERS,
Technical Univ. of Denmark, Lyngby. Kemisk Laboratorium A.
J. Ruzicka, and E. H. Hansen.
Analytica Chimica Acta, Vol 63, No 1, p 115-128, January 1973. 4 fig, 3 tab, 13 ref.

Descriptors: *Aqueous solutions, *Cadmium, *Volumetric analysis, *Evaluation, Storage, Calibrations.
Identifiers: *Selectrode, *Ion selective electrodes, *Sensitivity, Conditioning, Cadmium nitrate.

A series of cadmium buffers was prepared and used for calibration of a newly developed cadmium Selectrode activated with CdS/Ag2S. The electrode exhibits Nernstian response with a sensitivity close to the theoretical limit imposed by the conditional solubility product of cadmium sulphide, i.e., the response is linear up to pCd 9 at pH 6.7 and up to pCd 11 at pH 9. It is suitable for direct measurements of cadmium ion activities as well as for direct compleximetric titrations of cadmium ions. Prolonged storage or use in acid solutions below pH 3 increases the standard potential value and causes a gradual loss of sensitivity, because of dissolution of cadmium sulphide. When damaged, the ionsensitive surface can, however, be readily renewed as with any other Selectrode. (See also W73-01079) (Little-Battelle)
W73-08800

MODERN APPROACH TO COASTAL ZONE SURVEY,
Michigan Univ., Ann Arbor. Willow Run Labs.
For primary bibliographic entry see Field 02L.
W73-08805

SOME APPLICATIONS OF PHOTOGRAPHY, THERMAL IMAGERY AND X BAND SIDE LOOKING RADAR TO THE COASTAL ZONE,
Grumman Ecosystems Corp., Bethpage, N.Y.
For primary bibliographic entry see Field 02L.
W73-08806

THE COLUMBIA RIVER ESTUARY AND ADJACENT OCEAN WATERS, BIOENVIRONMENTAL STUDIES.
For primary bibliographic entry see Field 02L.
W73-08816

STUDIES OF THE AEROBIC, NONEXACTING, HETEROTROPHIC BACTERIA OF THE BENTHOS,
Georgia Univ., Athens. Dept. of Microbiology.
For primary bibliographic entry see Field 02L.
W73-08830

METHODS FOR THE MEASUREMENT OF HANFORD-INDUCED GAMMA RADIOACTIVITY IN THE OCEAN,
(AEC), Division of Biology and Medicine, Washington, D.C.
For primary bibliographic entry see Field 02L.
W73-08841

METAL-ION CONCENTRATIONS IN SEA-SURFACE MICROLAYER AND SIZE-SEPARATED ATMOSPHERIC AEROSOL SAMPLES IN HAWAII,
Hawaii Univ., Honolulu. Dept. of Chemistry.
For primary bibliographic entry see Field 02K.
W73-08852

RAPID CHANGES IN THE FLUORIDE TO CHLORINITY RATIO SOUTH OF GREENLAND,
Bedford Inst., Dartmouth (Nova Scotia). Atlantic Oceanographic Lab.
For primary bibliographic entry see Field 02K.
W73-08869

FORMS AND DYNAMICS OF SULFUR IN PEAT AND LAKE SEDIMENTS OF BELORUSSIA (FORMY I DINAMIKA SERY V TORFAKH I OSADKAKH OZER BELORUSSII),
Akademiya Navuk BSSR, Minsk. Institut Geokhimii i Geofiziki.
For primary bibliographic entry see Field 02J.
W73-08883

CESIUM KINETICS IN A MONTANE LAKE ECOSYSTEM,
Colorado State Univ., Fort Collins.
For primary bibliographic entry see Field 05B.
W73-08901

MERCURY IN SEDIMENTS FROM THE THAMES ESTUARY,
Institute of Geological Sciences, London (England). Geochemical Div.
J. D. Smith, R. A. Nicholson, and P. J. Moore.
Environmental Pollution, Vol 4, No 2, p 153-157, February 1973. 2 fig, 1 tab, 3 ref.

Descriptors: *Mercury, *Sediments, *Soil analysis, *Chemical analysis, *Estuaries, Aquatic soils, Heavy metals, Saline soils, Sampling, Pollutant identification.
Identifiers: *Thames estuary, *Flameless atomic absorption spectrophotometry, Sample preparation.

Fresh unconsolidated surface sediment samples from the outer Thames estuary and samples from a

museum collection were analyzed for mercury by flame atomic absorption spectrophotometry. The fresh samples were collected using a cone dredge. Sample preparation involved shaking a quantity of the sediment overnight with 1N H2SO4 containing 0.5 g of KMnO4 in a polypropylene bottle. The excess KMnO4 and MnO2 formed were reduced by adding 30 percent H2O2 solution. The mercury was amalgamated on a silver wire coil and determined by flameless AAS. Comparison of results for the two groups indicates that there has been little overall change in this period, but levels in the recent sediments were generally higher than those obtained for samples of London clay deposited in Eocene times (approximately 50 million years ago). Mercury contents of the sediments range from 0.012 to 0.550 ppm, with the higher concentrations usually occurring in sediments containing a high proportion of fine particles. (Holoman-Battelle)
W73-08902

SECONDARY PRODUCTION OF SELECTED INVERTEBRATES IN AN EPHEMERAL POND,
Texas A and M Univ., College Station.
For primary bibliographic entry see Field 05C.
W73-08903

A SEMI-CONTINUOUS CULTURE TECHNIQUE FOR DAPHNIA PULEX,
York Univ. (England). Dept. of Biology.
A. M. Harvey.
Journal of Applied Ecology, Vol 9, No 3, p 831-834, December 1972. 1 fig, 18 ref.

Descriptors: *Waterfleas, *Laboratory equipment, Invertebrates, Zooplankton, Sampling, Crustaceans, Animal physiology, Methodology, Animal populations.
Identifiers: *Semi-continuous culture technique, *Daphnia pulex, Macroinvertebrates, Debris, Arthropods, Culturing techniques, Culturing vessels.

A semi-continuous culture system based on the bacterial chemostat has been developed for growing laboratory metazoan populations. The apparatus consists of a two-liter culture vessel from the Quickfit range, an agitation funnel for delicate agitation, and a jet and air supply tube of silicon. Sampling and debris removal were two problems encountered with the system but possible solutions are discussed. The operational procedure is as follows. Sterile D. pulex are introduced into the autoclaved culture vessel and the agitation system activated. The culture is allowed to increase and equilibrate for 6 days, and the pump is switched on again to give the desired dilution rate. In the conditions described, the doubling time in the phase of unlimited growth was just under 5 days, so a dilution rate of the order of 20 percent/day was used. The air supply producing positive pressure for the overflow is switched on, and overflow samples are counted regularly. The main advantages of the apparatus are of constancy in the environment, simplicity of control, and physiological uniformity. This system allowed successful culture of D. pulex through many generations; results were compatible with the classical chemostat theory. The methods used to minimize particular problems presented by Daphnia would easily be modified to allow the culture of other aquatic invertebrates in a similar system. (Holoman-Battelle)
W73-08904

LAND DEVELOPMENT AND HEAVY METAL DISTRIBUTION IN THE FLORIDA EVERGLADES,
Florida State Univ., Tallahassee, Dept. of Oceanography.
For primary bibliographic entry see Field 05B.
W73-08906

MICRODETERMINATION OF VOLATILE ORGANICS BY GALVANIC COULOMETRY,
Minnesota Univ., Minneapolis. Lab. for Biophysical Chemistry.
A. Anusiem, and P. A. Hersch.
Analytical Chemistry, Vol 45, No 3, p 592-594, March 1973. 3 fig, 2 tab, 7 ref.

Descriptors: *Organic compounds, *Volatility, *Aqueous solutions, Electrolytes, Oxygen, Pollutant identification, Chemical analysis, Methodology.
Identifiers: *Galvanic coulometry, *Trace levels, *Hydrocarbons, Nitrobenzene, Sensitivity.

The principle of determing organic gases and vapors carried by an inert gas stream upon adding a constant proportion of O2 to the stream, passing the stream through a hot tube for complete combustion, and determing the O2 left over in the effluent, can be extended to hydrocarbons and other slightly soluble species in an aqueous sample. Experiments conducted using stock solutions prepared from recrystallized nitrosobenzene confirm that combustion of trace organics followed by galvanic coulometry of the residual oxygen yields accurate analyses in the microgram range with only modest demands on time, training, and equipment. The range can probably be extended to much smaller quantities, given electronic amplification of the signal, before limitations by various types of noise are encountered. Ultimate sensitivity is expected to exceed that of flame ionization which contributes about 1 in 100,000 carbon atoms to the signal. Coulometry utilizes every carbon and hydrogen atom combusted. This principle should be applicable to effluent analysis in both gas and liquid chromatography and to many micro-analytical requirements of organic and biological chemistry. (Holoman-Battelle)
W73-08908

CALCIUM ION-SELECTIVE ELECTRODE IN WHICH A MEMBRANE CONTACTS GRAPHITE DIRECTLY,
Lever Bros. Co., Edgewater, N.J. Research and Development Div.
For primary bibliographic entry see Field 02K.
W73-08910

DECOMPOSITION OF OIL POLLUTANTS IN NATURAL BOTTOM SEDIMENTS,
Rutgers - The State Univ., New Brunswick, N.J.
For primary bibliographic entry see Field 05B.
W73-08911

THE DISTRIBUTION, SUBSTRATE SELECTION AND SEDIMENT DISPLACEMENT OF COROPHIUM SALMONIS (STIMPSON) AND COROPHIUM SPINICORNE (STIMPSON) ON THE COAST OF OREGON,
Oregon State Univ., Corvallis.
For primary bibliographic entry see Field 05B.
W73-08912

ANALYSIS OF HALOGENATED BIPHENYLS BY PULSED SOURCE-TIME RESOLVED PHOSPHORIMETRY,
Florida Univ., Gainesville. Dept. of Chemistry.
C. M. O'Donnell, K. F. Harbaugh, R. P. Fisher, and J. D. Winefordner.
Analytical Chemistry, Vol 45, No 3, p 609-611, March 1973. 2 fig, 1 tab, 6 ref.

Descriptors: *Chemical analysis, *Methodology, Polychlorinated biphenyls, Organic compounds, Pollutant identification Separation techniques.
Identifiers: *Halogenated biphenyls, *Quantitative analysis, *Pulsed source time resolved phosphorimetry, *Mixtures, Errors, Precision, Phosphorescence spectra, 2-chlorobiphenyl, 4-chlorobiphenyl, 4-bromobiphenyl, 4-iodobiphenyl.

Pulsed source, time resolved phosphorimetry has been used for the quantitative analysis of several mixtures of halogenated biphenyls. The procedure followed was identical to that of Fisher and Winefordner (1972) except for changes involving delay and sweep times with reference to recording the phosphorescence decay curve. The sweep time was chosen to temporally compress the shorter-lived species with respect to the longest-lived phosphor; the resulting phosphorescence signal of the longest-lived species extrapolated to zero delay time was subtracted from the sum of the two longest-lived phosphors to determine the phosphorescence signal of the intermediate lived species. Analysis of a 4-halobiphenyl mixture in ethanolic solvent resulted in a maximum absolute error in concentration of 5 percent or less for 4-chlorobiphenyl and 4-bromobiphenyl and 14 percent for the shortest-lived species, 4-iodobiphenyl. A mixture of 2-chlorobiphenyl and 4-chlorobiphenyl similarly measured resulted in errors of 5.4 and 10 percent, respectively. With this method it is possible to analyze structurally and spectrally similar molecules. Quantitative information and qualitative identification of species aided by phosphorescence lifetimes can be obtained. For very complex mixtures, a simple thin layer or gas chromatographic separation prior to analysis may also be needed, but overall, the time for analysis of a multicomponent mixture should be considerably reduced as compared to methods previously used. (Holoman-Battelle)
W73-08913

EFFECTS OF SIZE-SELECTIVE PREDATION ON COMMUNITY STRUCTURE IN LABORATORY AQUATIC MICROCOSMS,
Texas Univ., Austin.
For primary bibliographic entry see Field 05C.
W73-08914

INFLUENCE OF PH ON THE RESPONSE OF A CYANIDE ION SELECTIVE MEMBRANE ELECTRODE,
Rome Univ. (Italy). Istituto di Chimica Analitica.
M. Mascini.
Analytical Chemistry, Vol 45, No 3, p 614-615, March 1973. 1 fig, 7 ref.

Descriptors: *Hydrogen ion concentration, *Iodides, *Chemical reactions, Aqueous solutions, Electrochemistry.
Identifiers: *Ion selective electrodes, *Cyanides, Accuracy, Errors, Reaction products.

Chemical reactions are given in contrast with those given previously to better describe the effect of pH on the response of a cyanide ion-selective electrode membrane. Values of iodide and cyanide concentrations as a function of pH obtained with the new equation show that the results from previous determinations agree only above pH 9. It is concluded that the response of the cyanide electrode is affected by undissociated HCN which can generate I ions. The same considerations can be used to explain the behavior of cyanide selective membrane electrodes in the presence of a metal ion that binds CN (-) in strong or weak complexes. (Little-Battelle)
W73-08916

SIGNIFICANCE OF CELLULOSE PRODUCTION BY PLANKTONIC ALGAE IN LACUSTRINE ENVIRONMENTS,
Massachusetts Univ., Amherst.
For primary bibliographic entry see Field 05C.
W73-08917

RAPID METHYLATION OF MICRO AMOUNTS OF NONVOLATILE ACIDS,
Pittsburgh Univ., Pa. School of Medicine.
M. J. Levitt.
Analytical Chemistry, Vol 45, No 3, p 618-620, March 1973. 1 fig, 1 tab, 11 ref.

Descriptors: *Organic acids, *Laboratory equipment, Chemical analysis, Research equipment, Design, Pollutant identification, Methodology.
Identifiers: *Methylation, *Nonvolatile acids, *Esterification, *Sample preparation, *Diazomethane generating system, Electron capture gas chromatography, Methyl esters, Lithocholic acid.

A Diazomethane Generating System is described which permits microgram or smaller amounts of complex organic acids to be quantitatively esterified without detectable side-product formation. Multiple samples can be processed in sequence at two-minute intervals. The methyl esters produced are suitable for further analysis by electron-capture gas chromatography. The apparatus is constructed from components present in most laboratories, and may be dismantled easily for storage. Details are given on the construction and operation of the esterification apparatus. (Holoman-Battelle)
W73-08918

DESIGN AND EVALUATION OF A LOW COST RECORDING SPECTROPOLARIMETER,
Cleveland State Univ., Ohio. Dept. of Chemistry.
For primary bibliographic entry see Field 07B.
W73-08919

IMPROVED EXPERIMENTAL TECHNIQUE FOR REVERSE ISOTOPE DILUTION METHOD,
Rohm and Haas Co., Bristol, Pa. Bristol Research Labs.
W. H. Graham, and W. E. Bornak.
Analytical Chemistry, Vol 45, No 3, p 623-624, March 1973. 2 tab, 1 ref.

Descriptors: *Radioactivity techniques, *Methodology, *Pollutant identification, *Radiochemical analysis, *Pollutants, Chemical analysis, Pesticides, Pesticide residues, Radioactivity, Laboratory equipment, Radioisotopes.

The carrier-addition or reverse isotope dilution (RID) method is a useful technique for both qualitative and quantitative identification of radioactive compounds in complex mixtures. Described are the principles involved, the apparatus and procedures used, and the results obtained in trials of a modified RID technique. In the modified RID method, the test of constant specific radioactivity is determined differently. Instead of isolating the crystalline material after each recrystallization, it is necessary to radioassay only the mother liquor. Two consecutive recrystallizations of a chemically pure but radiolabeled material will contain the same amount of radioactivity in the same volume of mother liquor at constant temperature. At that point, the crystalline material may be isolated and radioassayed to determine its specific activity and complete the analysis. The advantages of the method are speed and simplicity; the small amount of cold carrier and radioactive material needed; ease of handling sensitive carrier compounds; and increased boiling range of solvent systems, including mixed solvents, available through use of pressure vials. The RID method is particularly useful in pesticide residue analysis because trace levels of multiple degradation products can be determined quantitatively from the radioactive parent pesticide. (Holoman-Battelle)
W73-08920

DATA PROCESSING ESTIMATIONS FOR SAMPLE SURVEYS,
Georgia Univ., Athens.
For primary bibliographic entry see Field 07C.
W73-08921

DIRECT QUALITATIVE AND QUANTITATIVE INFRARED SPECTROSCOPIC ANALYSIS OF ZINC-DIALKYLDITHIOCARBAMATE WITHOUT PRIOR SEPARATION, (DIREKTE QUALITATIVE UND QUANLITATIVE INFRAROTSPEKTROSKOPISCHE ANALYSE VON ZINK-DIALKYLDITHIOCARBAMIDATEN OHNE VORHERGEHENDE AUFTRENNUNG),
Technische Hochschule, Vienna (Austria). Institut fuer Analytische Chemie und Mikrochemie.
W. Sztark, H. Malissa, and R. Kellner.
Analytica Chimica Acta, Vol 63, No 2, p 285-293, February 1973. 13 fig, 2 tab, 19 ref.

Descriptors: *Pollutant identification, Chemical analysis, Heavy metals, Methodology.
Identifiers: *Mixtures, *Zinc-dialkyldithiocarbamates, *Infrared spectrophotometry, Infrared spectra, Detection limits, Quantitative analysis, Zinc-dimethyldithiocarbamate, Zinc-diaethyldithiocarbamate, Zinc-dibutyldithiocarbamate, Zinc-dibenzyldithiocarbamate, Organometallic compounds.

A new method for the i.r. analysis of zinc-dialkyldithiocarbamate mixtures has been developed. The identification and detection limits were improved, compared to the standard method, by the use of microtechniques (identification limit 2 micrograms, detection limit 30-80 micrograms). Binary and ternary mixtures can be analyzed without preliminary separation, because the other components of the mixtures have very little influence on the measured absorption band. Beer's law was obeyed for the binary and two ternary mixtures. The relative standard deviations and the coefficients of correlation were calculated for the macro- and micromethods. A comparison of statistical data shows that i.r. spectroscopy is suitable for quantitative analysis even in the region of 80-10 micrograms of substance. (See also W73-08923) (Holoman-Battelle)
W73-08922

A METHOD FOR THE QUALITATIVE AND QUANTITATIVE INFRARED SPECTROSCOPIC ANALYSIS OF METAL--TETRAMETHYLENEDITHIOCARBAMATE MIXTURES WITHOUT PRIOR SEPARATION (EINE METHODE ZUR QUALITATIVEN UND QUANTITATIVEN INFRAROTSPEKTROSKOPISCHEN ANALYSE VON METALL-TETRA-METHYLENDITHIOCARBAMIDAT--GEMISCHEN OHNE VORHERGEHENDE AUFTRENNUNG),
Technische Hochschule, Vienna (Austria). Institut fuer Analytische Chemie und Mikrochemie.
H. Malissa, and R. Kellner.
Analytica Chimica Acta, Vol 63, No 2, p 263-275, February 1973. 10 fig, 3 tab, 11 ref.

Descriptors: *Chemical analysis, *Methodology, *Pollutant identification, *Trace elements, *Aqueous solutions, Chelation, Heavy metals, Mercury, Iron, Cobalt, Nickel, Sodium, Alkali metals.
Identifiers: *Metal complexes, *Infrared spectrophotometry, *Quantitative analysis, *Mixtures, Infrared spectra, Metal chelates, Detection limits, Lead-tetramethylenedithiocarbamate, Mercury-tetramethylenedithiocarbamate, Iron-tetramethylenedithiocarbamate, Cobalt-tetramethylenedithiocarbamate, Nickel-tetramethylenedithiocarbamate.

A method for the direct i.r. analysis of metal-tetramethylenedithiocarbamate mixtures without preceding separation is proposed. Because of the remarkable shifts of the M-S-stretching vibrations and the small losses of energy by stray light, the region beyond 400/cm is the most useful for a determination in potassium bromide. Model analyses with standard mixtures of Pb (II)- and Hg (II)-TMDTC, and Fe (III)-, Co (III)- and Ni (II)-TMDTC are described. The method can be used for the determination of trace amounts of heavy metals in aqueous solutions after complexation with Na-TMDTC and extraction with chloroform. The detection limit for application of the 13-mm standard KBr method and a routine spectrometer (without ordinate expansion) is about 10 micrograms of metal. (See also W73-08922) (Holoman-Battelle)
W73-08923

STATISTICAL METHODS FOR THE DETECTION OF POLLUTION UTILIZING FISH MOVEMENTS,
Virginia Polytechnic Inst. and State Univ., Blacksburg.
For primary bibliographic entry see Field 05B.
W73-08924

RESULT OF FLUVIAL ZINC POLLUTION ON THE ZINC CONTENT OF LITTORAL AND SUB-LITTORAL ORGANISMS IN CARDIGAN BAY, WALES,
University Coll. of Wales, Aberystwyth. Dept. of Zoology.
For primary bibliographic entry see Field 05B.
W73-08925

(I) OBSERVATIONS OF SMALL PHOTOCURRENTS ON THE DROPPING MERCURY ELECTRODE AND (II) A STUDY OF THE ADSORPTION OF TRIFLUOROMETHYL SULFONATE ON MERCURY,
Georgetown Univ., Washington, D.C.
J. C. Kreuser.
Available from Univ. Microfilms, Inc., Ann Arbor, Mich. 48106. Order No. 72-34,182. Ph D Dissertation, 1972. 332 p.

Descriptors: *Adsorption, *Aqueous solutions, *Electrochemistry, Light.
Identifiers: *Photocurrents, *Dropping mercury electrode, *Trifluoromethyl sulfonate, Ion selective electrodes.

Part I deals with the photoemission of electrons from mercury in aqueous solutions. An instrument was built to measure photocurrents, and experimental results obtained with it are described. Mathematical methods used to analyze the data are shown in detail. Threshold potentials E sub T obtained by extrapolation of current-voltage curves do not show the expected dependence on light energy E sub L, i.e., d E sub T/d E sub L is not equal to 1. Several possible sources of error have been investigated, but no satisfactory explanation has been found. Part II deals with the specific adsorption of the trifluoromethyl sulfonate (CF3SO3 (-)) anion on the dropping mercury electrode, using a constant ionic strength approach. Data were taken with the system described in Part I, and analyzed directly by computer. Results indicated adsorption of CF3SO3 (-) is similar to that of Cl04 (-) and NO3 (-). (Little-Battelle)
W73-08926

SOUND VELOCIMETERS MONITOR PROCESS STREAMS,
NUSonics, Inc. Paramus, N.J.
E. M. Zacharias, Jr., and D. W. Franz.
Chemical Engineering, Vol 80, No 2, p 101-108, January 22, 1973. 6 fig, 1 tab, 9 ref.

Descriptors: *Monitoring, *Aqueous solutions, *Flowmeters, *Flow rates, *Specific gravity, *Density, *Suspended solids, *Compressibility, Measurement, Flow measurement, Electronic equipment.
Identifiers: *Sound velocimeters, Sound waves.

Sound velocimeters have been developed which can be used to accurately monitor changes in density, specific gravity, bulk modulus, concentration of solutions, solids content, and percent conversion of monomers to polymers in process streams. The instrumemts employ an electro-acoustic amplifier, which acts as a transmitter and receiver,

and a reflector to form a sonic path of fixed length. Transit time of the signal is a function of the path length, and the composition and temperature of the liquid. By proper calibration of the equipment, it can be used for the aforementioned determinations. By combining two velocimeters with the proper electronics, flow rates can be determined. Results have shown that the equipment is accurate and versatile, and provides repeatable results. (Little-Battelle)
W73-08933

GAGING AND SAMPLING INDUSTRIAL WASTEWATERS,
Calgon Corp., Pittsburgh, Pa.
J. G. Rabosky, and D. L. Koraido.
Chemical Engineering, Vol 80, No 1, p 111-120, January 8, 1973. 8 fig, 4 tab, 12 ref.

Descriptors: *Waste water (Pollution), *Water sampling, *Flow measurement, Methodology, *Monitoring, Equipment, *On-site investigations, *Pollutant identification, Water pollution sources, Mathematical studies, *Industrial wastes, On-site tests, Laboratory tests, Chemical properties, Waste identification, Stream gages, Flow rates, Discharge (Water), Path of pollutants, Effluent streams, Chemical analysis, Weirs, Venturi flumes, Flowmeters.
Identifiers: Automatic samplers, Composite samples, Grab samples, Sample preservation, Sample preparation, Parshall flumes, Total organic carbon, Cyanides, Kjeldahl nitrogen, Grease, Sulfites, Silver, Barium, Antimony, Arsenic, Selenium, Chlorinated hydrocarbons, Organic nitrogen.

The generally accepted techniques for determining waste water flow (gaging) and collecting representative samples for the identification and quantification of pollutants are discussed. Selection of sampling sites and the method of sampling are very important. In obtaining samples for laboratory analysis, composite sampling (manual or automatic) is preferred to grab sampling since the former results in samples which represent average plant conditions over a relatively long period. Wastewater streams can be continuously and automatically monitored and analyzed by reliable on-stream effluent-monitoring equipment currently on the market. More than 40 parameters can be monitored and analyzed by such equipment. In addition to the selection of sample points and the methods of sampling, the volume of sample required, analyses required, and proper handling and preservation of the samples must be taken into account. Methods for gaging flows in large open channels include (1) numerical methods which consider depth, area, velocity and discharge at points along the stream; and (2) the use of current meters (the various types are briefly described). For other types of streams, (1) water meters on influent pipes, (2) a bucket and stopwatch, and (3) pumping rate and length of discharge may be used. Additional methods of measuring flow and their specific applications are tabulated and discussed. (Holoman-Battelle)
W73-08935

CHARACEAE OF AUSTRALIA,
Rhode Island Univ., Kingston. Dept. of Botany.
R. D. Wood.
Nova Hedwigia, Vol 22, Nos 1-2, p 1-9, 1971. 1 tab.

Descriptors: *Australia, *Chlorophyta, *Aquatic algae, *Systematics, Aquatic plants, Plant morphology, Pollutant identification, Ecological distribution.
Identifiers: *Stoneworts, *Characeae, Speciation, Chara vulgaris, Chara globularis, Chara setosa, Chara zeylanica, Chara braunii, Chara corallina, Chara fibrosa, Chara leptopitys, Chara ecklonii, Chara baueri, Lamprothamnium papulosum, Lychnothamnus barbatus, Nitella acuminata, Nitella stuartii, Nitella myriotricha, Nitella leptostachys, Nitella tasmanica, Nitella furcata, Nitella pseudoflabellata, Nitella subtilissima, Nitella hyalina.

A floristic study of the Characeae of Australia was made based upon extensive collecting in 1960-61 throughout the continent together with a re-examination of available herbarium specimens. Twenty-nine species are treated in accordance with the author's revised classification; and a key, brief descriptions, figures, and lists of specimens cited are provided. Five genera are represented--Chara, Lamprothamnium, Lychnothamnus, Nitella, and Tolypella. The most common species in decreasing order of frequency of occurrence are C. corallina, N. pseudofalbellata, Lamp. papulosum, N. cristat, and N. lhotzkyi. Examples of species widespread in the world which are least common in Australia are C. zeylanica and N. acuminata. Eight species are endemic--C. leptopitys, N. congesta, N. cristat, N. lhotzkyi, N. penicillata, N. subtilissima, N. tumida, and N. verticillata. Of these, all but the last are known to be dioecious. The results generally support the author's earlier revision, but newly-rediscovered type material (MEL) requires several changes and reinterpretations of the literature. In addition, four new varieties are described, and seven new varietal combinations are made. (Holoman-Battelle)
W73-08937

THE DYNAMICS OF BROWN TROUT (SALMO TRUTTA) AND SCULPIN (COTTUS SPP.) POPULATIONS AS INDICATORS OF EUTROPHICATION,
Michigan State Univ., East Lansing.
W. L. Smith.
Available from Univ. Microfilms, Inc., Ann Arbor, Mich. 48106 Order No. 73-5491. Ph D Dissertation, 1972. 53 p.

Descriptors: *Brown trout, *Sculpins, *Bioindicators, *Eutrophication, Fish populations, Coldwater fish, Freshwater fish, Fish reproduction, Fish physiology, Survival, Michigan, Pollutant identification.
Identifiers: Salmo trutta, Cottus spp, Jordan River, Au Sable River, Population density.

Brown trout and sculpin populations were studied in three variously perturbed stream sites in northern Michigan. Intraspecific comparisons were made of several aspects of population dynamics including the intrinsic rate of natural increase (r). The upper Jordan River, nearly pristine and with high population densities, exhibited r values judged adequate for maintenance of the populations. The other sites were compared with this baseline. The moderately perturbed lower Jordan River had less population densities and survival but greater mean fecundities for both species. This resulted in a positive r for the trout but the birth rate of the sculpins could not compensate for the death rate and the population was declining. The Au Sable River, the most eutrophic, also had lesser population densities and greater mean fecundities than the upper Jordan. Survivorship of the sculpins was sufficient to yield a positive r. The low survival of the trout resulted in a strongly negative r, suggesting inability of the population to sustain itself. The intrinsic rate of natural increase of short-lived, coldwater fish species could be a useful tool in monitoring water quality, especially if studies were continued through several generations. (Holoman-Battelle)
W73-08940

ISOLATION OF BACTERIA CAPABLE OF UTILIZING METHANE AS A HYDROGEN DONOR IN THE PROCESS OF DENITRIFICATION,
National Inst. for Water Research, Pretoria (South Africa).
T. R. Davies.
Water Research, Vol 7, No 4, p 575-579, April 1973. 2 tab, 14 ref.

Descriptors: *Methane bacteria, *Denitrification, Laboratory tests, *Isolation, *Pollutant identification, Methane, Nitrogen, Hydrogen, Water pollution sources, Anaerobic conditions.
Identifiers: *Substrate utilization, Energy sources, *Enrichment, *Culture media, Fate of pollutants, Growth, Methanol, Ethanol, Malate, Lactate, Methanomonas, Culturing techniques, Alcaligenes spp, Achromobacter spp, Pseudomonas spp, Bacillus, Micrococcus denitrificans, Substrates.

Bacteria were isolated which are able to denitrify when methane is supplied as the sole carbon source. These isolates were not found to be specific to methane, but could use other carbon compounds as hydrogen donors. They were capable of using nitrate both as a source of cell nitrogen and as an alternative terminal electron acceptor to oxygen. Results obtained from a laboratory scale dentrifying unit indicated that denitrification with methane as the energy source could become an attractive commercial proposition. (Holoman-Battelle)
W73-08941

MOLECULAR ARCHITECTURE OF THE CHLOROPLAST MEMBRANES OF CHLAMYDOMONAS REINHARDI AS REVEALED BY HIGH RESOLUTION ELECTRON MICROSCOPY,
California Univ., Los Angeles.
For primary bibliographic entry see Field 05C.
W73-08942

SORPTION OF COPPER ON LAKE MONONA SEDIMENTS - EFFECT OF NTA ON COPPER RELEASE FROM SEDIMENTS,
Wisconsin Univ., Madison. Water Chemistry Program.
For primary bibliographic entry see Field 05B.
W73-08946

MASS AND MONOXENIC CULTURE OF VORTICELLA MICROSTOMA ISOLATED FROM ACTIVATED SLUDGE,
Tokyo Univ. (Japan). Inst. of Applied Microbiology.
R. Sudo, and S. Aiba.
Water Research, Vol 7, No 4, p 615-621, April 1973. 3 fig, 1 tab, 13 ref.

Descriptors: *Protozoa, Growth rates, *Activated sludge, *Isolation, Animal growth, Cultures, Sewage bacteria, Biomass, Animal populations, Invertebrates, Pollutant identification.
Identifiers: *Mass cultures, *Monoxenic cultures, *Vorticella microstoma, Alcaligenes faecalis, Culture media.

Following previous work on the monoxenic culture of Vorticella microstoma isolated from activated sludge, Sudo and Aiba (1971), a mass culture of the protozoa was attempted. An appropriate range of phosphate buffer concentration in cultivating the protozoa, using sludge bacteria as food, was from 1/150 to 1/75 M, and the optimum pH value of the culture medium ranged from 6.5 to 7.5. For a measurement of dry mass of single cells of Vorticella microstoma, and also for an assessment of some relationship between protozoan growth and bacterial consumption, a pure culture of Alcaligenes faecalis was given as food. The specific growth rate, mu (equals 1.5-1.8/day) observed with the protozoa was independent of the inoculum size, provided the bacterial concentration was less than 200 mg/l (360,000,000/ml). The yield on conversion from Alcaligenes faecalis to Vorticella microstoma was 0.47. (Holoman-Battelle)
W73-08950

THE USE OF COLIPHAGE AS AN INDEX OF HUMAN ENTEROVIRUS POLLUTION IN AN ESTUARINE ENVIRONMENT,
New Hampshire Univ., Durham.
J. M. Vaughn.
Available from Univ. Microfilms, Inc., Ann Arbor, Mich. 48106 Order No. 73-4361. Ph D Dissertation 1972. 68 p.

Descriptors: *Bioindicators, *Estuaries, Viruses, Sewage effluents, Oysters, E. coli, Enteric bacteria.
Identifiers: *Shellfish waters, *Coliphages, *Enterovirus, Survival, Characterization, *Biological samples, Fecal pollution, Isolation, Macroinvertebrates.

Parallel examinations of sewage effluents, shellfish and shellfish growing waters for coliphage and enteric virus indicated a wide dissemination of coliphage throughout the estuary, generally occurring in the absence of detectable enteric virus activity. A majority of the enteric virus isolations were observed in samples yielding no coliphage activity. Under controlled conditions, oysters were observed to accumulate more coliphage than enteric virus. Replication of coliphage in the estuary during the summer months was shown to occur when proper host cell was present. Two major coliphage types were observed in field samples based on their reactivity with different Escherichia coli strains. Survival times of coliphage and enteric virus in estuarine waters along with retention values in oysters were shown to be similar with a slight advantage shown by coliphage. Inability to correlate accurately coliphage and enteric virus occurrence in field samples along with the potential for the presence of more than one dominant coliphage type indicated the serious shortcomings of the coliphage indicator system as a method of enteric virus detection. A secondary characterization study was performed on one of the two dominant bacteriophage types occurring in field samples. Nutritional studies revealed an absolute requirement for copper ions. (Little-Battelle)
W73-08951

PULSE POLAROGRAPHY IN PROCESS ANALYSIS. DETERMINATION OF FERRIC, FERROUS, AND CUPRIC IONS,
North American Rockwell Corp., Thousand Oaks, Calif. Science Center.
E. P. Parry, and D. P. Anderson.
Analytical Chemistry, Vol 45, No 3, p 458-463, March 1973. 6 fig, 1 tab, 7 ref.

Descriptors: *Polarographic analysis, *Chemical analysis, *Pollutant identification, Sampling, Cations, Iron, Copper, Electrolytes, Methodology, Automation, Kinetics.
Identifiers: *Pulse polarography, *Process streams, Chemical interference, Pyrophosphate, Sensitivity, Reproducibility.

A form of pulse polarography was described which can be used for automated analysis of process streams. The technique is rapid, has good sensitivity, and is not severely affected by small amounts of oxygen. For the automated analysis, a sample (5-10 microliters) was drawn from the sample stream and added to the polarographic cell. Sulfuric acid was added, the solution bubbled for 3 minutes, and the potential pulse was applied to determine Cu. Pyrophosphate solution adjusted to 0.1 M and 0.002 percent in Triton X-100 was added and the ferric and ferrous ions were determined. Only one 50-millisecond pulse to the diffusion plateau for each species to be analyzed was required for the analysis after suitable calibration. The choice of supporting electrolyte (s) is of great importance in the successful application of the technique. For determination of two different oxidation states of the same species (or where both oxidation states can be present), it is necessary that the pulse polarographic wave be irreversible. The kinetic parameters are discussed. Pyrophosphate solution was shown to be a suitable medium for the simultaneous determination of ferric and ferrous ions and the pulse polarographic behavior of these ions, as well as cupric ion in this medium, is described in detail. (Holoman-Battelle)
W73-08952

SOLID STATE ION-SELECTIVE MICROELECTRODES FOR HEAVY METALS AND HALIDES,
State Univ. of New York, Buffalo. Dept. of Chemistry.
J. D. Czaban, and G. A. Rechnitz.
Analytical Chemistry, Vol 45, No 3, p 471-474, March 1973. 4 fig, 11 ref.

Descriptors: *Heavy metals, *Halides, *Anions, *Cations, Copper, Cadmium, Lead, Chlorides, Bromides, Iodides, Design, Selectivity, Physical properties, Electrical properties.
Identifiers: *Microelectrodes, *Ion selective electrodes, Silver, Sensors, Solid state electrodes.

Ion-selective microelectrodes with tip diameters of 100-150 microns of the type (1) metal sulfide/silver sulfide, selective towards Ag, Cu, Pb, and Cd cations, and (2) silver halide/silver sulfide, selective towards sulfide, bromide, chloride, and iodide anions were constructed and evaluated in solution volumes of 0.5-1.0 microliters. Details are given for the preparation of materials, forming of membranes, machining of microtips, and construction of probe electrodes. Successful microelectrodes for Ag, Cu, Cd, Pb, chloride, bromide and iodide are reported. (Holoman-Batelle)
W73-08954

ON THE MICROBIOLOGY OF SLIME LAYERS FORMED ON IMMERSED MATERIALS IN A MARINE ENVIRONMENT,
Hawaii Univ., Honolulu.
For primary bibliographic entry see Field 05C.
W73-08955

GAS-SOLID CHROMATOGRAPHY OF ORGANIC ACIDS AND AMINES USING STEAM CONTAINING FORMIC ACID OR HYDRAZINE HYDRATE AS CARRIER GASES,
Tokyo Univ. of Education (Japan). Inst. for Optical Research.
A. Nonaka.
Analytical Chemistry, Vol 45, No 3, p 483-487, March 1973. 4 fig, 13 ref.

Descriptors: *Organic acids, Methodology, *Organic compounds, Acidity, Alkalinity, Laboratory equipment.
Identifiers: *Amines, *Steam carrier gas solid chromatography, Gas solid chromatography, Carrier gas, Formic acid, Hydrazine hydrate, Adsorbents, Flame ionization detector, Sample preparation, Chromatography columns, Fatty acids, Stearic acid, Ethylenediamine, Ethanolamine, n-propylamine, n-butylamine, Amylamine, n-hexylamine, n-octylamine, Laurylamine, Stearylamine, Acetic acid, Propionic acid, n-caproic acid, Enanthic acid, Lauric acid, Myristic acid, Palmitic acid.

Gas-solid chromatography can be carried out for samples of free organic acids and amines using carrier steam containing 10 percent formic acid or 10 to 20 percent hydrazine hydrate. The mixed carrier vapors are introduced into the column by pumping aqueous solutions of formic acid or hydrazine hydrate into a vaporizing port set in the GC system. The adsorbents, such as diatomaceous firebrick and porous glass beads, can be used as stationary solids, without any coating. The FID can be employed as a detector with the mixed carriers. The effect of stream and the added polar vapors is so significant that acid and amine samples are eluted very rapidly without any marked tailing. By changing the carrier vapor from the acidic to a basic one, acid and amine samples can be analyzed on the same column. Chromatography of lower and higher fatty acids and their alkaline salts, lower and higher fatty amines, etc. is reported. (Holoman-Battelle)
W73-08956

PERIPHYTON PRODUCTION AND GRAZING RATES IN A STREAM MEASURED WITH A P-32 MATERIAL BALANCE METHOD,
Oak Ridge National Lab., Tenn.
J. W. Elwood, and D. J. Nelson.
Oikos, Vol 23, No 3, p 295-303, 1972. 6 fig, 2 tab, 29 ref.

Descriptors: *Standing crops, *Grazing, *Periphyton, *Biomass, *Radioactivity techniques, *Primary productivity, Phosphates, Streams, Cycling nutrients, Sampling, Water analysis, Snails, Mollusks, Secondary productivity.
Identifiers: Goniobasis clavaeformis, Macroinvertebrates.

Net production rates and standing crops of periphyton and grazing rates on periphyton were measured in a small, woodland stream in southeastern United States using a material balance method. The material balance of radioactive phosphorus was followed at three times during the year in periphyton, consumer organisms, and stream water for up to six weeks following a one-hr release of P-32 labelled PO4 to the stream. Rates of decrease of P-32 in periphyton per unit weight,per unit area of substrate, and in the entire study reach of stream were used to compute biomass turnover rates. Periphytonstanding crops in July, September, and November were estimated at 200, 198, and 658 mg ash-free dry weight per sq m respectively, while estimates of net production rates were 22, 24, and 16 mg ash-free dry weight per sq m per day, respectively. Estimated grazing rates on periphyton during these periods were 23, 15, and 14 mg ash-free dry wt per sq m per day, respectively. Biomass turnover rates of periphyton suggest that grazing limited periphyton production rates in this stream by controlling the standing crop of periphyton. The method is of wide applicability since less than maximum permissible concentrations of radioactive phosphorus were used in the spike releases. (Little-Battelle)
W73-08958

DEOXYRIBONUCLEIC ACID IN ECOSYSTEMS,
North Carolina Univ., Chapel Hill.
M. J. Canoy.
Available from Univ. Microfilms, Inc., Ann Arbor, Mich. 48106 Order No. 73-4806. Ph D Dissertation, 1972. 355 p.

Descriptors: *Trophic level, *Biomass, *Primary productivity, *Respiration, *Ecosystems, Stress, Aquatic plants, Algae, *Chlorophyll, Model studies, Secondary productivity.
Identifiers: *DNA, Chlorophyll a, Thalassia.

Thirteen temperate and tropical ecosystems were sampled for DNA content per gram dry weight of major species making up 90 percent or more of the biomass. Mean DNA/g/ species data were used to derive mean DNA/sq m concentrations. Tropical and temperate producers were found to have a range of DNA contents from 0.02 mg/g to 0.72 mg/g with a mean of 0.36 mg/g for aquatic plants and a range of 0.22 mg/g to 1.20 mg/g for terrestrial producers with a mean of 0.46 mg/g. Mean DNA content was very similar for all systems studied. That of producer systems was 0.40-0.50 mg/g and that of consumers was 4.50-6.00 mg/g. Mean DNA concentration per square meter was also similar for normal systems of similar type. Attached aquatic systems had 83.00-420.00 mg/sq m. Calculations of DNA by trophic level indicate that for mature systems, where most major elements are considered, the trophic level biomass pyramid can

be converted essentially to a rectangle by multiplying biomass by mean DNA content for each trophic level. Evidence is presented indicating that large deviations in one trophic level's DNA may be due to stress, input of energy from an outside source, or failure of the researcher to account for the major portion of a trophic level. DNA per square meter increased in a roughly linear fashion proportional to community production or chlorophyll a concentrations, DNA concentration varied logarithmically with respiration. Control functions of DNA, including effects on biochemical pools, time constants and exchange rates, are discussed and a model is developed to illustrate effects of changes in DNA concentrations. (Little-Battelle)
W73-08961

CHARACTERIZATION OF SEVERAL THYMINE-REQUIRING MUTANTS OF ESCHERICHIA COLI Y MEL,
New Hampshire Univ., Durham.
For primary bibliographic entry see Field 05C.
W73-08964

SEROLOGICAL AND PHYSIOLOGICAL CHARACTERISTICS OF ANAEROBIC, NON-SPOREFORMING, GRAM-NEGATIVE BACILLI,
North Carolina Univ., Chapel Hill.
G. L. Lombard.
Available from Univ. Microfilms, Inc., Ann Arbor, Mich. 48106 Order No. 73-4896. Ph D Dissertation, 1972. 136 p.

Descriptors: *Anaerobic, Bacteria, *Pollutant identification, Separation techniques, Bacteria.
Identifiers: *Fluorescent antibody techniques, *Antisera, *Bacteroides, *Fusobacterium, Bacteroides biacutus, Bacteroides clostridiiformis, Bacteroides fragilis, Bacteroides trichoides, Bacteroides hypermegas, Fusobacterium fusiforme, Fusobacterium mortiferum, Fusobacterium necrogenes, Fusobacterium necrophorum, Fusobacterium novum, Fusobacterium nucleatum, Fusobacterium russii.

Fluorescent antibody (FA) reagents were prepared for 10 Bacteriodes and 7 Fusobacterium species. These included B. biacutus, B. clostridiformis ss girans, B. fragilis (ss fragilis, ss thetaiotaomicron, ss ovatus, ss distasonis, ss vulgatus), B. trichoides, B. hypermegas, F. fusiforme, F. mortifierum, F. necrogenes, F. necrophorum, F. novum, F. nucleatum, and F. russii. The morphologica, cultural, and physiological characteristics of all bacterial strains used were examined to verify identity. Antisera for each species were prepared in rabbits, and immunoglobulins were precipitated with ammonium sulfate and conjugated with fluorescein isothiocyanate. Most of the antisera were species or subspecies specific by the tube agglutination technique. Also, the majority of the FA conjugates were species or subspecies specific. At least seven different serotypes were detected in the fusiform group. Two FA conjugates prepared from antisera to two different strains of B. fragilis ss fragilis allowed identification of 41 of 43 strains of this microorganism in a blind study. The results suggest that FA techniques can be developed for rapid identification of Bacteroides and Fusobacterium species. (Little-Battelle)
W73-08965

ELECTRON MICROSCOPY OF FREEZE--ETCHED PREPARATIONS OF KLEBSIELLA PNEUMONIAE,
Georgia Univ., Athens.
E. L. Springer.
Available from Univ. Microfilms, Inc., Ann Arbor, Mich. 48106 Order No. 73-5792. Ph D Dissertation, 1972. 150 p.

Descriptors: *Electron microscopy, *Slime, Cultures.
Identifiers: *Freeze etching, *Klebsiella pneumoniae, *Enterobacter aerogenes, Characterization, Cell structures.

The capsule of Klebsiella pneumoniae and slime of Enterobacter aerogenes A3 (SL) were examined by electron microscopy using the freeze-etch technique, which permits observation of hydrated specimens. The capsule of K. pneumoniae was composed of several layers containing many fibers 10 nm thick; while the polysaccharide slime of E. aerogenes A3 (SL) was composed of a diffuse network of fibrils. This work represents the first time the image of a hydrated bacterial capsule or slime has been observed in the electron microscope. The slime of E. aerogenes A3 (SL) resembled the layered structure of the capsule of K. pneumoniae. Freeze-etching of the bacterial plasms membrane revealed a mosaic of glycoprotein granules (10 nm in diameter) on the fracture surface. A capsule of phagocytized K. pneumoniae was observed to be a layered structure resembling the freeze-etched preparations of pure cultures of K. pneumoniae. (Little-Battelle)
W73-08966

THE ISOLATION AND CHARACTERIZATION OF A HITHERTO UNDESCRIBED GRAM-NEGATIVE BACTERIUM,
North Texas State Univ., Denton.
C. B. Lassiter.
Available from Univ. Microfilms, Inc., Ann Arbor, Mich. 48106 Order No. 73-2916. Ph D Dissertation, 1972. 144 p.

Descriptors: *Cultures, Toxicity, Heavy metals, Salinity, *Pollutant identification, Separation techniques, *Pseudomonas.
Identifiers: Characterization, Pseudomonas multiflagella, Culture media, *Isolation.

A unique undescribed gram-negative rod is extensively characterized. The most distinguishing characteristic of the water isolate is a polar tuft of 35-40 flagella that aggregate to function as a single organelle which is visible under phase contrast. Aging cells deposit poly-beta-hydroxybutyric acid granules. It also possesses an unusual exterior membrane outside the cell wall which contains large fibrils of protein. The organism grows optimally at 37 C, under well aerated conditions. The optimum beginning pH is 7.0. This organism does not ferment carbohydrates nor can it utilize them as a source of carbon and energy. It is catalase negative and reduces nitrates to nitrites. It does not liquefy gelatin or attack starch. It is oxidase-positive but does not produce indole or hydrogen sulfide. It has no vitamin or amino acid requirement and grows well when many of the amino acids in the aspartic acid family are offered as a substrate. It was only able to utilize sodium acetate and malic acid as sources of carbon and energy. It is best cultivated in the laboratory in a medium containing 0.2 percent sodium acetate, 0.01 percent calcium chloride, and 0.05 percent sodium acetate. It cannot survive sodium chloride concentrations above 0.5 percent. Metal ions were found to be toxic to the organism, with the divalent metal ions being approximately twice as toxic as the monovalent ions. After careful evaluation of the findings, the new bacterium was subsequently named Pseudomonas multiflagella. (Little-Battelle)
W73-08968

LEUCOTHRIX MUCOR AS AN ALGAL EPIPHYTE IN THE MARINE ENVIRONMENT,
Indiana Univ., Bloomington.
J. A. Bland.
Available from Univ. Microfilms, Inc., Ann Arbor, Mich. 48106 Order No. 73-2688. Ph D Dissertation, 1972. 179 p.

Descriptors: *Cultures, *Rhodophyta, *Artificial substrates, *Hosts, Marine Bacteria, Sea water, On-site tests.
Identifiers: *Leucothrix mucor, *Survival, Epiphytes, Bangia, Porphyra.

This study was concerned with the marine bacterium Leucothrix mucor as an algal epiphyte and showed (1) that the algal-bacterial relationship is essential for the survival of leucothrix; and (2) that Leucothrix is an algal epiphyte throughout the intertidal zone. These conclusions were verified by first selecting and field testing a suitable artificial substrate so that the role of the natural living host might be evaluated more easily. Polypropylene strips were chosen, and found to accumulate the benthic flora of the algae which served as a substrate for attachment by L. mucor. The second technique developed was a method to quantitate populations of Leucothrix on any given substrate. The technique is based on the optical design of the microscope being used. Experimental results showed that Leucothrix would attach and grow on the artificial substrate, but was crowded out rapidly by the other attaching benthic forms. When L. mucor was attached to the strips in the laboratory and then incubated in natural environments, growth occurred, but was poor. When given a choice between natural and artificial substrates, Leucothrix attached preferentially to the natural host. Thus the conclusion that the natural host is essential for the survival of Leucothrix was supported. Particular species of red algae, Bangia and Porphyra, were found to be the preferred hosts. (Little-Battelle)
W73-08970

AERIAL REMOTE SENSING, A BIBLIOGRAPHY.
Office of Water Resources Research, Washington, D.C.
For primary bibliographic entry see Field 07B.
W73-08974

STUDIES ON SOME EGYPTIAN FRESHWATER ISOLATES OF UNICELLULAR GREEN ALGAE,
Ain Shams Univ., Cairo (Egypt). Dept. of Botany.
S. M. Taha, S. A. Z. Mahmoid, M. A. Abdel-Halim, and M. M. El-Haddad.
J Microbiol U A R. Vol 3 No 2, p 113-121. 1970 Illus.
Identifiers: *Algae, Carbon dioxide, Cells, *Chlorella, *Chlorococcum, *Egypt (UAR), Light, Oxides, Temperature, Chlorophyta.

Unicellular green algae were isolated from different localities in the United Arab Republic. The isolates were purified and identified to genus. Six isolates of the genus Chlorella and 3 isolates of Chlorococcum were finally obtained. Isolates were screened to select the most active organism. The cultivation of the isolates was attained under controlled conditions of light (2500 lux), temperature (30 C) and a stream of 5% CO2 in air mixture by using a specially designed apparatus.--Copyright 1972, Biological Abstracts, Inc.
W73-09020

CHROMATOGRAPHIC SEPARATION AND DETERMINATION OF BENZENE AND ISOPROPYLBENZENE IN WATER, (IN RUSSIAN),
Nauchno-Issledovatelskii Institut Gigieny, Moscow (USSR).
Z. N. Boldina.
Gig Sanit. Vol 36 No 9, p 69-70. 1971.
Identifiers: *Benzene, *Chromatographic separation, *Isopropyl benzene, Pollutant identification.

The methods proposed for investigating benzene and isopropylbenzene in water are based on the ability of these compounds to be nitrated and yield a colored compound following the addition of al-

kali and acetone. The minimum determinable concentration of isopropylbenzene on the chromatogram was 10 microgram and of benzene 5 microgram.--Copyright 1972, Biological Abstracts, Inc.
W73-09028

USE OF C14 FOR ACCELERATED DETERMINATION OF THE NUMBER OF ESCHERICHIA COLI IN WATER, (IN RUSSIAN),
Institute of General and Municipal Hygiene, Moscow (USSR).
L. E. Korsh, O. I. Yurasova, A. G. Nikonova, and M. A. Motova.
Gig Sanit. Vol 36, No 9, p 78-81, 1971. Illus.
Identifiers: Carbon dioxide, *Carbon-14, Metabolic rate, Oxides, Water pollution, *E. coli, *Pollutant identification.

The proposed method for rapid determination of the number of E. coli in waste waters is based on the quantity of metabolic carbon dioxide evolved as a result of their activity from media labeled with 14C. Calibration curves of metabolic carbon dioxide plotted against the number of bacteria in the sample were constructed for rapid determination of the number of bacteria.--Copyright 1972, Biological Abstracts, Inc.
W73-09032

USE OF GAS CHROMATOGRAPHY IN HYGIENIC INVESTIGATIONS, (IN RUSSIAN),
Nauchno-Issledovatelskii Institut Gigieny, Moscow.
V. A. Voronenko, and Y. V. Novikov.
Gig Sanit. Vol 36, No 9, p 81-87, 1971.
Identifiers: Air pollution, Chromatography, Food, *Gas chromatography, Hygienic studies, Industry, Water pollution, *Pollutant identification.

Gas-chromatographic analysis can be used for investigating atmospheric pollution, pollution of the air of industrial rooms, water pollution, for establishing the quality and nutritive value of food products and the presence of extraneous chemical impurities in them and for detecting traces of medicinal preparations, hormones, pesticides, food colors, etc.--Copyright 1972, Biological Abstracts, Inc.
W73-09033

GAS CHROMATOGRAPHY IN ENVIRONMENTAL SAFETY: A CONTRIBUTION ON GAS CHROMATOGRAPHY INVESTIGATION OF WATER, (IN GERMAN),
G. Goeke.
Fette Seifen Anstrichm. Vol 74, No 3, p 168-172, 1971, Illus. English summary.
Identifiers: Chromatography, Effluents, Environmental effects, *Gas chromatography, Industrial wastes, Lakes, Rivers, *Pollutant identification.

The detection of mineral oil, gasoline, petroleum, various organic solvents and pesticides is reported along with specific mention of instrumental parameters. The analytical chemist is often faced with a difficult task, because of the complexity of possible impurities in water. Besides the constant pollution of rivers and lakes with more or less well-clarified water from the civic communities, pollution is mainly caused periodically by industrial effluents due to disposal of toxic substances from factories, either intentionally or negligently. In addition, materials stored in underground tanks, basements and garbage depots pose a standing threat to groundwater.--Copyright 1972, Biological Abstracts, Inc.
W73-09034

THE INFLUENCE OF YEARLY WEATHER VARIATIONS ON SMOKE AND SULPHUR DIOXIDE POLLUTION IN PRETORIA,
National Physical Research Lab., Pretoria (South Africa).
E. Kemeny, and E. C. Halliday.
Arch Meteorol Geophys Bioklimatol Ser B Klimatol Umweltmeteorol Strahlungsforsch. Vol 20, No 1 p 49-78, 1972. Illus.
Identifiers: Oxide, *Air pollution, *Pretoria, Smoke, South Africa, *Sulfur dioxide, Weather, Yearly.

In Pretoria, South Africa, the atmospheric pollution by smoke and SO2 shows 2 distinct seasons: one (Oct.-March) during which the concentrations are low; and another during which the concentrations go through 3 phases: general increase (April-May), maximum concentration (June-July) and general decrease (Aug.-Sept.). The 2 different seasons can be explained by the fact that 7 main weather types occur over Pretoria and the South African highveld. Between Oct. and March rain and atmospheric instability predominate whereas between May and Sept. weather characterized by atmospheric stability prevails. April is a transition period between these extremes. The annual and diurnal variations in the concentrations of smoke and SO2 in the atmosphere which are mainly due to climatic factors are discussed. Long-term trends indicate that smoke levels remained fairly constant at the 2 sites where they were measured over periods of 13 and 7 yr, respectively, whereas the levels of SO2 decreased markedly. The long-term trends are due to human factors.--Copyright 1972, Biological Abstracts, Inc.
W73-09038

WATER-AFFECTED FRACTION OF NATURAL 1.5-9 MICRO DIAMETER AEROSOL PARTICLES,
National Center for Atmospheric Research, Boulder, Colo.
J. Rosinski, and C. T. Nagamoto.
J Colloid Interface Sci. Vol 40, No 1, p 116-120. 1972. Illus.
Identifiers: *Aerosol particles, *Colorado, Microns, Particles, Pollution, *Hydrosol particles.

The water-affected fraction of a given size class of an aerosol population reflects the change in particle concentration when that population becomes hydrosolized. The water-affected fraction was determined for natural aerosol particles in the 1.5-9 micro diameter size range. The largest change was observed in the 1.5-3 micro size group in a polluted atmosphere, especially in the presence of scattered rain and overcast sky. The aggregates formed through evaporation of cloud droplets seem to be the principal source of smaller hydrosol particles. Parallel determination of changes in air concentration of chloride particles and water-affected fraction of aerosol particles, coupled with analysis of air parcel trajectories, showed excellent agreement in identification of the movement of maritime air parcels over the central part of the continent (Colorado).--Copyright 1973, Biological Abstracts, Inc.
W73-09055

ON THE ECOLOGY OF HETEROTROPHIC MICROORGANISMS IN FRESHWATER,
Queen's Univ., Belfast (Northern Ireland). Dept. of Botany.
For primary bibliographic entry see Field 02I.
W73-09058

HETEROTROPHIC ASSAYS IN THE DETECTION OF WATER MASSES AT LAKE TAHOE, CALIFORNIA,
California Univ., Davis. Dept. of Zoology; and California Univ., Davis. Inst. of Ecology.
For primary bibliographic entry see Field 05C.
W73-09059

PROTEIN QUALITY OF SOME FRESHWATER ALGAE,
North Carolina State Univ., Raleigh.
For primary bibliographic entry see Field 02I.
W73-09070

5B. Sources of Pollution

ESTUARINE POLLUTION, A BIBLIOGRAPHY.
Office of Water Resources Research, Washington, D.C.
For primary bibliographic entry see Field 02L.
W73-08451

STREAM POLLUTION FROM CATTLE BARNLOT (FEEDLOT) RUNOFF,
Ohio State Univ., Columbus. Dept. of Agricultural Engineering.
R. K. White.
Available from the National Technical Information Service as PB-220 010, $3.00 in paper copy, $1.45 in microfiche. Ohio Water Resources Center, Columbus, Project Completion Report No. 393X, December, 1972, 33 p, 14 fig, 5 tab, 5 ref. OWRR A-023-OHIO (1).

Descriptors: *Agricultural runoff, *Feed lots, *Cattle, Water pollution sources, Water quality, Livestock, *Biochemical oxygen demand, *Chemical oxygen demand, *Ohio, *Farm wastes, *Solid wastes.

This project has established that solids, BOD and COD transport in barnlot runoff are significant. (A barnlot, as distinguished from a feedlot, has less than 100 head of cattle wintered in a lot with access to a barn for feeding, watering and/or sleeping. The barnlot is typical for about two-thirds, 700,000, of the beef cattle raised in Ohio.) Runoff from a 0.17-hecatre, unpaved barnlot at the North Appalachian Experimental Watershed, Coshocton, Ohio, with 60 beef steers, was monitored. Thirty-nine events were sampled and analyzed in the period, March, 1970 to April, 1972. Total solids in the runoff varied from 0.10 to 1.20%. The BOD concentration varied from 9 mg/l (Jan, 1970) to 640 mg/l (Feb, 1972). Runoff usually occurs with rainfall of 1.3 cm (0.5 in.) or more. Antecedent soil moisture conditions significantly affect the amount of solids, BOD and COD in the runoff, with increased amounts following extended periods without rainfall. Graphs show that BOD concentrations and transport were higher in the winter and significantly less in the summer. A significant reduction of solids and BOD in the runoff was effected by using a grassed waterway or runoff collection pond and irrigation.
W73-08459

THE RELATION BETWEEN SOIL CHARACTERISTICS, WATER MOVEMENT AND NITRATE CONTAMINATION OF GROUNDWATER,
Kentucky Water Resources Inst., Lexington.
G. W. Thomas.
Available from the National Technical Information Service as PB-220 015, $3.00 in paper copy, $1.45 in microfiche. Research Report No 52, September 1972. 35 p, 4 fig, 9 tab, 14 ref. OWRR A-024-KY (1), 14-31-0001-3217.

Descriptors: *Leaching, *Nitrates, *Fertilizers, *Water pollution sources, Infiltration, Soil water movement, Return flow, Ion transport, *Kentucky.

Soils from several areas in Kentucky were placed in columns and leached with Ca (NO3)2. Subsoils high in iron oxide were found to retard the leaching of nitrate very significantly. In other soils, the nitrate moved through as fast as or slightly faster than the water. Field application of nitrogen to corn was most efficient in the spring or summer near the time that corn takes it up. The one exception to this was a red soil, where fall application of nitrogen resulted in little loss due to the retarding effect. Soils on which a sod or cover crop is killed and in which corn is planted lose little water by evaporation. Because of this, much more water movement occurs and nitrate moves out of the soil during the summer. In contrast, the soil

without a killed sod mulch suffers no loss of nitrate during the growing season. Stream samples in 1971 and 1972 during the months of January through May showed a poor relation between nitrate in the water and land use. Nitrate in tile effluent was much higher than that in non-tile drainage. This leads to the conclusion that the nitrate concentrations of tile effluents are not reliable indicators of nitrate leaving a tiled field. (Knapp-USGS)
W73-08465

HYDRAULIC AND SEDIMENT TRANSPORT STUDIES IN RELATION TO RIVER SEDIMENT CONTROL AND SOLID WASTE POLLUTION AND ECONOMIC USE OF THE BY-PRODUCTS,
Kentucky Water Resources Inst., Lexington.
For primary bibliographic entry see Field 02J.
W73-08468

DEGRADATION OF RIPARIAN LEAVES AND THE RECYCLING OF NUTRIENTS IN A STREAM ECOSYSTEM,
Kentucky Water Resources Inst., Lexington.
L. A. Krumholz, R. G. Lambert, C. R. Liston, and H. H. Woodward.
Available from the National Technical Information Service as PB-220 018, $3.00 in paper copy, $1.45 in microfiche. Report No 57, 1972. 36 p, 3 fig, 5 tab, 52 ref. OWRR A-032-KY (2). 14-31-0001-3217.

Descriptors: *Cycling nutrients, *Primary productivity, *Streams, *Kentucky, *Leaves, Nutrients, Food chains, Biodegradation, Aquatic habitats, Ecology, Degradation (Decomposition), Decomposing organic matter, Water pollution sources.

Leaves from riparian vegetation in the upper 5 km of Doe Run, Meade County, Kentucky, yielded an annual accumulation within the stream of 354 g per sq m per yr. Leaves of sycamore (23.6%), red oak (21.7%), sugar maple (9.7%), beech (9.6%), white oak (7.1%), and hickory (6.0%) were most abundant, and leaves from 14 other kinds made up the remaining 22.3%. About a third of the annual leaf fall occurred during the last half of October and about two-thirds in the last 3 months of the year. Calorific equivalents ranged from 3,789 cal/g dry weight for hickory to 4,417 cal/g for red oak. Allochthonous leaf material made an annual contribution of about 70 million kcal of energy. Protein, carbohydrate, and lipid contents of leaves varied independently of seasons with average values of about 52, 79, and 32 mg/g dry weight, respectively. In leaves submersed in the stream experimentally, carbohydrates leached rapidly, lipids leached slowly, and there was an apparent increase in protein content. Amphipods preferred hickory, red elm, sugar maple, beech, red oak, and sycamore leaves as food in that order. (Knapp-USGS)
W73-08471

RADIOCHEMICAL MONITORING OF WATER AFTER THE CANNIKIN EVENT, AMCHITKA ISLAND, ALASKA, JULY 1972,
Geological Survey, Lakewood, Colo.
L. J. Schroder, and W. C. Ballance.
Available from NTIS, Springfield, Va 22151 Price $3.00 printed copy; $1.45 microfiche. Geological Survey Report USGS-474-166 (Amchitka-37), March 1973. 15 p, 3 fig, 2 tab, 4 ref. AEC AT (29-2)-474.

Descriptors: *Water quality, *Radiochemical analysis, *Nuclear explosions, *Alaska, Underground, Sampling, Groundwater, Surface waters, Tritium, Data collections, Correlation analysis, Path of pollutants.
Identifiers: *Amchitka Island (Alaska), *Cannikin event (Alaska), Gross alpha determinations, Gross beta determinations.

The U.S. Geological Survey established a sampling program on Amchitka Island in 1967 in cooperation with the U.S. Atomic Energy Commission. Water samples are analyzed routinely for tritium, gross alpha, and gross beta/gamma content. Frequency of sampling was semiannual prior to the Cannikin underground nuclear explosion and has been bimonthly since the Cannikin event (November 6, 1971). The sampling frequency will be quarterly for the remainder of the first year (through November 1972). Sampling frequency will be changed to an annual basis approximately 1 1/2 years after the event. Radiochemical data are presented from samples collected during July 1972. The gross alpha activity, as U equivalent, ranged from less than 0.3 to 3.0 pCi/liter (picocuries per liter). The gross beta activity in water as Cs-137 equivalent ranged from 2.0 to 39 pCi/liter. The only water samples having detectable tritium activity that is greater than 640 pCi/liter (200 tritium units) were those collected at the Long Shot site. The gross alpha and gross beta determinations showed no trends when compared with previously determined ranges for fresh waters on Amchitka Island. (Woodard-USGS)
W73-08479

BIODEGRADATION OF PETROLEUM IN SEA-WATER AT LOW TEMPERATURES,
Rutgers - The State Univ., New Brunswick, N.J. Dept. of Biochemistry and Microbiology.
R. M. Atlas, and R. Bartha.
Canadian Journal of Microbiology, Vol 18, No 12, p 1851-1855, December 1972. 5 fig, 14 ref.

Descriptors: *Microbial degradation, *Biodegradation, *Sea water, *Water temperature, Gas chromatography, Water sampling, Inhibition, Weathering, Monitoring, Chemical analysis.
Identifiers: *Crude oil, *Fate of pollutants, Carbon dioxide evolution technique, Mineralization, Degradation rates, Sweden crude oil, Coastal waters.

To evaluate the significance of biodegradation in the removal of polluting oil from cold oceans, freshly collected seawater samples were treated with petroleum and were incubated at controlled temperatures between 5 and 20C. Biodegradation was monitored by the measurement of CO2 evolution and by quantitative gas chromatographic analysis. Low water temperatures not only resulted in slower degradation rates, but caused increasing lag periods that preceded the onset of measurable biodegradation. A substantial portion of these lag periods was eliminated when, instead of fresh petroleum, a 'weathered' sample was used. The results suggest that some volatile components of petroleum that are inhibitory to oil-degrading microorganisms evaporate only very slowly at low temperatures, and thus retard biodegradation. (Holoman-Battelle)
W73-08531

PERSISTENCE AND REACTIONS OF C-1-4-CACODYLIC ACID IN SOILS,
Agricultural Research Service, Beltsville, Md. Agricultural Environmental Quality Inst.
E. A. Woolson, and P. C. Kearney.
Environmental Science and Technology, Vol 7, No 1, p 47-50, January 1973. 4 fig, 4 tab, 18 ref.

Descriptors: *Arsenicals (Pesticides), *Pesticide kinetics, *Soil types, Persistence, Chemical reactions, *Soil contamination, Herbicides, Soil analysis, Chemical analysis, Degradation (Decomposition), Soil chemical properties, Soil physical properties, Pesticide residues, Clay loam, Aerobic conditions, Biodegradation, Loam, Radioactivity techniques.
Identifiers: *Cacodylic acid, Chemical distribution, Hagerstown silty clay loam, Lakeland loamy sand, Fate of pollutants, Christiana clay loam, Hydroxydimethylarsine oxide, Arsenic, Recovery, Carbon dioxide evolution.

Carbon-14-labeled cacodylic acid (hydroxydimethyl-arsine oxide) was prepared by reacting C-14 methyl iodide with methyl dichloroarsine. Concentrations of 1, 10, and 100 ppm of cacodylic acid were established in three soils of varying iron and aluminum content. At 2, 4, 8, 16, 24, and 32 weeks, soils were analyzed for C-14 and total arsenic in the water-soluble (ws), calcium (Ca), iron (Fe), and aluminum (Al) fractions. Initially, cacodylic acid was distributed in the following fractions: ws much greater than Al greater than Fe greater than Ca. After 32 weeks, the distribution was ws greater than Al greater than Fe greater than Ca. In contrast, inorganic arsenate (5 plus) was largely present in the Fe and Al fractions. Cacodylic acid persistence was a function of soil type and after 32 weeks the following amounts of C-14 were recovered in each soil type by combustion: Christiana (23 percent), Hagerstown (53 percent), Lakeland (62 percent). A decrease in both total C-14 and total arsenic occurred in all soils with time. A pungent garlic odor was detected in soils receiving 100 ppm, suggesting the production of a volatile alkyl arsine. The loss of arsenic suggests that one route of cacodylic acid loss from aerobic and anaerobic soils is by alkyl arsine volatility. Degradation under aerobic conditions also occurred by cleavage of the C-As bond, presumably yielding CO2 and AsO4 (3 minus). This degradation is presumably due to microbiological action. (Holoman-Battelle)
W73-08542

EFFECT OF PULPMILL EFFLUENT ON DISSOLVED OXYGEN IN A STRATIFIED ESTUARY -- I. EMPIRICAL OBSERVATIONS,
Fisheries Research Board of Canada, Nanaimo (British Columbia). Biological Station.
For primary bibliographic entry see Field 05C.
W73-08543

EFFECT OF PULPMILL EFFLUENT ON DISSOLVED OXYGEN IN A STRATIFIED ESTUARY - II. NUMERICAL MODEL,
Fisheries Research Board of Canada, Nanaimo (British Columbia). Biological Station.
For primary bibliographic entry see Field 05C.
W73-08544

FATTY ACIDS IN SURFACE PARTICULATE MATTER FROM THE NORTH ATLANTIC,
Rhode Island Univ., Kingston. Graduate School of Oceanography.
For primary bibliographic entry see Field 05A.
W73-08552

CARBON DIOXIDE CONTENT OF THE INTERSTITIAL WATER IN THE SEDIMENT OF GRANE LANGSO, A DANISH LOBELIA LAKE,
Copenhagen Univ. (Denmark). Freshwater Biological Lab.
For primary bibliographic entry see Field 05A.
W73-08555

DECOMPOSITION OF DISSOLVED ORGANIC CARBON AND NITROGEN COMPOUNDS FROM LEAVES IN AN EXPERIMENTAL HARD-WATER STREAM,
Michigan State Univ., Hickory Corners. W. K. Kellogg Biological Station.
R. G. Wetzel, and B. A. Manny.
Limnology and Oceanography, Vol 17, No 6, p 927-931, November 1972. 3 fig, 20 ref.

Descriptors: Water pollution sources, *Decomposing organic matter, *Microbial degradation, *Leaves, Water analysis, Model studies, Path of pollutants, Degradation (Decomposition), Biodegradation, Bacteria, Cultures, Population, Leaching, Chemical analysis, Spectrophotometry.
Identifiers: *Dissolved organic nitrogen, *Dissolved organic carbon, Natural organics, Dissolved organic matter.

To study decomposition of natural organic substances in water, dry hickory and maple leaves, enclosed in nylon mesh, were immersed in one of two 12-m recirculating streams simulating natural hard-water woodland streams. Particulate organic carbon was determined by sulfuric-dichromate oxidation and spectrophotometry; total dissolved organic carbon was determined by persulfate oxidation of filtrates and infrared CO2 analysis; and total dissolved organic nitrogen was fractionated into labile and refractory components on the basis of UV combustion and spectrophotometry. Bacteria were also counted. Addition of leaves for 30 hr increased dissolved organic carbon (DOC) levels nearly 10-fold. Bacterial populations which developed rapidly decomposed labile organic carbon and nitrogen compounds in the leaf leachate within 72 hr. Bacteriologically labile and refractory dissolved organic carbon fractions, with T1/2 decomposition rates of 2 and 80 days, respectively, were present in the leachate. Most refractory dissolved organic nitrogen compounds persisted unmodified for at least 24 days. The processing capacity of woodland streams for natural dissolved organic compounds is much greater than previously believed. (Little-Battelle)
W73-08558

TRACE ELEMENTS IN CLAMS, MUSSELS, AND SHRIMP,
Institut Royal des Sciences Naturelles de Belgique, Brussels.
K. K. Bertine, and E. D. Goldberg.
Limnology and Oceanography, Vol 17, No 6, p 877-884, November 1972. 4 tab, 11 ref.

Descriptors: *Trace elements, *Clams, *Mussels, *Shrimp, *Neutron activation analysis, *Path of pollutants, Shellfish, Chemical analysis, Invertebrates, Mollusks, Crustaceans, Iron, Cobalt, Chromium, Zinc, Mercury.
Identifiers: *Shells, Tissue, Antimony, Scandium, Selenium, Silver, Ensis ensis, Ensis arcuatus, Ensis siligua, Ensis vagsina, Mytilus edulis, Mytilus afer, Mytilus galloprovincialis, Crangon crangon, Arthropods.

Compositional changes in the trace element content of shells of mussels and clams that might be related to man's influence on the composition of inshore marine waters over the past hundred years were sought but not found. The elements Rb, Fe, Co, Sb Sc, Ag, Cr, Zn, Se, and Hg were analysed in freshly caught and museum specimens by instrumental neutron activation analysis. Contamination from the preservatives was evident in the shells and tissues of museum specimens. Elemental concentrations in the calcareous shells, both aragonitic and mixed aragonitic-calcitic, are similar and may reflect the composition of the waters in which they lived, rejection by the organisms, or surface associated features. The proteinaceous molts of shrimp contained high levels of these elements, in agreement with previous investigations. With 20-25 molts per shrimp per year, the molting of shrimp can cause a redistribution of these elements within the marine environment. (Holoman-Battelle)
W73-08561

MERCURY IN A MARINE PELAGIC FOOD CHAIN,
Stanford Univ., Pacific Grove, Calif. Hopkins Marine Station.
G. A. Knauer, and J. H. Martin.
Limnology and Oceanography, Vol 17, No 6, p 868-876, November 1972. 2 fig, 6 tab, 25 ref.

Descriptors: *Mercury, *Zooplankton, *Phytoplankton, Marine fish, *Food chains, Chemical analysis, Path of pollutants, Pollutant identification, Heavy metals, Methodology, Sampling, Copepods, Diatoms, Protozoa, *California.
Identifiers: *Organic mercury, *Monterey Bay (Calif), Atomic absorption spectrophotometry, Flameless atomic absorption spectrophotometry, Sample preparation, Anchovy, Monterey Bay, Myctophidae, Engraulis mordax, Euphausiids, Gills, Muscle, Skin, Liver, Gonads, Diaphus theta, Tarletonbeania crenularis, Stenobrachius leucopsaris, Lampanyctus ritteri.

Phytoplankton, zooplankton, and anchovies collected in Monterey Bay, California, over a 10-month period were analyzed for total mercury. Known wet weight or dry weight quantities of homogenized samples were weighed into disposable ampoules, a 2:1 solution of concentrated H2SO4 and HNO3 added (wet samples were chilled over ice), and the samples heated overnight at 80C. After acid digestion, the ampoules were chilled in ice and a 6 percent KMnO4 solution added for the development of color. Excess permanganate was reduced with 30 percent H2O2 and the solution was back titrated with the permanganate solution to yield a pink color (this avoided suppression of peaks). The sample digest was drawn, a reductant added, and the Hg partitioned on a vortex mixer. The resulting vapor was injected into an AA spectrophotometer. A few samples of anchovies and phytoplankton were analyzed for organic Hg by flameless AAS after extracting the homogenate with benzene and cysteine acetate. The cysteine/Hg complex was treated as for total Hg except no HNO3 or back titration was necessary. In general, mercury levels were low and no evidence of food chain amplification was observed. Temporal variations of Hg concentrations in phytoplankton were greater than those for zooplankton; however, no seasonal trends were observed for either group. Mercury levels were approximately equal in inshore and offshore zooplankton. The highest average mercury concentration was found in phytoplankton-net samples from the open ocean that contained radiolarians and other small zooplankton forms as well as diatoms. (Holoman-Battelle)
W73-08562

DISTRIBUTION AND FORMS OF NITROGEN IN A LAKE ONTARIO SEDIMENT CORE,
Department of Energy, Mines and Resources, Burlington (Ontario). Canada Center for Inland Waters.
A. L. W. Kemp, and A. Mudrochova.
Limnology and Oceanography, Vol 17, No 6, p 855-867, November 1972. 3 fig, 4 tab, 34 ref.

Descriptors: *Nitrogen, *Lake sediments, *Cores, *Lake Ontario, *Sediment-water interface, *Spatial distribution, Amino acids, Soil analysis, Chemical analysis, Nitrates, Nitrites, Path of pollutants, Bottom sediments, Sampling, Aquatic soils, Hydrogen ion concentration, Mud, Hypolimnion, Denitrification, Ammonification.
Identifiers: Ammonium, Hexosamine, Fate of pollutants, Surface sediments, Organic nitrogen, Nitrification.

Fixed ammonium nitrogen is the dominant inorganic form of nitrogen in the sediments of Lake Ontario. The fixed ammonium nitrogen concentration is around 300 micrograms/g of sediment at the top of a 10-m core and increases gradually to 525 micrograms at 150 cm, below which it remains constant. As nitrification is precluded in the reduced sediments below 3 cm, the ammonium ion is either fixed within the sediment clay lattices or migrates upward in the sediment interstitial waters. The uniform fixed and exchangeable ammonium concentrations below 150 cm in the core indicate that the sediment is saturated with respect to ammonium fixation, and the decrease in these concentrations above 150 cm in the core suggest that equilibrium is not attained with the ammonium ion. The deeper sediments probably do not regenerate nitrogen to Lake Ontario, but most of the nitrogen released to the hypolimnion by the sediments is from nitrification, denitrification, and ammonification reactions at the sediment-water interface. A minimum of 20 percent of the organic nitrogen input to the sediments is regenerated to the lake from the top 6 cm of sediments. About 90 percent of the nitrogen in the surface muds is organic: 28-46 percent as amino acid-N, 4-7 percent as hexosamine-N, and 21-31 percent as hydrolyzable unidentified-N. From 29-57 percent of the total nitrogen could not be accounted for as amino acids, hexosamines, fixed and exchangeable ammonia, nitrate, and nitrite in the surface sediments. (Holoman-Battelle)
W73-08563

COLLABORATIVE STUDY OF THE CATION EXCHANGE CAPACITY OF PEAT MATERIALS,
Michigan Dept. of Agriculture, East Lansing.
V. A. Thorpe.
Journal of the Association of Official Analytical Chemists, Vol 56, No 1, p 154-157, January 1973. 1 tab, 5 ref.

Descriptors: *Peat, *Humus.
Identifiers: *Collaborative studies, *Cation exchange capacity, *Reed-sedge, Sample preparation, Sphagnum moss, Statistical methods.

To provide a measure of the total amount of exhangeable cations that can be held by peat expressed as mequiv./100 g air-dried peat, the modified method of Puustjarvi for cation exchange capacity has been proposed and studied collaboratively. The statistical treatment of the collaborators' results indicates a satisfactory degree of precision and accuracy for the 3 products considered, moss, humus, and reed-sedge. The method for cation exchange capacity of peat materials, with the description of the transfer technique included, has been adopted as official first action. The 7 ASTM methods have been adopted as procedures. (Little-Battelle)
W73-08567

BACTERIOPHAGES RECOVERED FROM SEPTAGE,
Pennsylvania Water and Gas Co., Scranton.
J. F. Calabro, B. J. Cosenza, and J. J. Kolega.
Journal Water Pollution Control Federation, Vol 44, No 12, p 2355-2358, December, 1972. 3 fig, 1 tab, 7 ref.

Descriptors: *Bacteriophage, *Electron microscopy, Pollutant identification, Septic tanks, Waste water (Pollution), Assay, E. coli, Coliforms, Cultures, Pollutants, Hosts, Bioindicators, Filtration, Pseudomonas, Detergents, Linear alkylate sulfonates.
Identifiers: *Coliphages, *Septage, *Citrobacter freundii, *Salmonella typhimurium, *Shigella flexneri, Host specificity, Sample preparation, Culturing techniques, Plaque counts, Alcaligenes, Streptococcus fecalis, Mima spp, Herella spp, Archomobacter spp.

A study was made to (a) determine the presence of bacteriophage in septage where numbers of coliforms are markedly reduced, (b) examine their morphology and host specificity, and (c) detect any biological effects of linear alkyl sulfonate (LAS) on phage attachment in the system. Three active filtrates were recovered, and two distinct morphological types were observed with an electron microscope. The short-tail phage infected Citrobacter freundii, Escherichia coli, and cell-wall mutants of Salmonella typhimurium, and a long-tail phage was specific for Shigella flexneri. Host specificity suggested three different types. Only rough strains of hosts were found to be susceptible to phage. Concentrations of LAS normally encountered in septage showed no deleterious effect on the phage and host model system used. (Holoman-Battelle)
W73-08587

STABILITY OF METAL DITHIOCARBAMATE COMPLEXES,
Carleton Univ., Ottawa (Ontario). Dept. of Chemistry.
For primary bibliographic entry see Field 05A.
W73-08595

WHAT'S KNOWN ABOUT PENTACHLOROPHENOLS,
Environmental Protection Service. Halifax (Nova Scotia).
R. P. Cote.
Water and Pollution Control, Vol 110, No 12, p 35-37, December 1972. 1 fig, 2 tab, 7 ref.

Descriptors: *Water pollution effects, *Toxicity, *Degradation (Decomposition), *Solubility, *Gas chromatography, *Invertebrates, *Fish, Snails, Shrimp, Water analysis, Fungicides, Atlantic salmon, Rainbow trout, Bioassay, Growth rates, Persistence, Frogs.
Identifiers: *Pentachlorophenol, *Sodium pentachlorophenol, Fate of pollutants, Tadpoles, Chloranilic acid, Dibenzo-p-dioxins, Slimicides, Sample preparation, Macroinvertebrates, Lebistes, Guppy, Gambusia affinis, Mosquito fish, White crappie, Pimephales promelas, Fathead minnow, Pomoxis annularis, Speckled trout, Benzoquinones, 2 4 5 6 tetrachloresorcinol, Leeches.

A review of the literature was conducted to summarize the available knowledge of pentachlorophenols, potentially harmful pollutants. The review covers production, use, chemical and physical properties, methods of analysis, toxicity to mammals and aquatic organisms, and effects on sludge bacteria. The evidence on pentachlorophenol and sodium pentachlorophenate as environmental contaminants suggests that the problem is not of the same magnitude as DDT or oil. Nevertheless, PCP and its salts cause significant impact in localized areas where it is continuously added to the environment. Heavy usage on an intermittent basis could also have severe consequences. Fortunately the persistence of PCP and its sodium salt are limited, however, their degradation products may present toxicity problems of a chronic or sublethal nature. (Little-Battelle)
W73-08599

THE SNOW REMOVAL CONTROVERSY,
Toronto Univ. (Ontario). Inst. of Environmental Sciences and Engineering.
J. C. Van Loon.
Water and Pollution Control, Vol 110, No 11, p 16, 19-20, November 1972. 5 tab, 3 ref.

Descriptors: *Water pollution sources, *Runoff, *Snow removal, *Heavy metals, *Chlorides, Oil, Phenols, Organic matter, Deicers, Nickel, Copper, Zinc, Lead, Iron, Cadmium, Phosphorus, Biochemical oxygen demand, Lakes, Rivers.
Identifiers: *Street salting, Grease.

Controversy has arisen in Canada over the effects of street salting and snow dumping in lakes and rivers. For the past three years, runoff from urban streets, contamination of urban and rural water courses, runoff and solids residues in contaminated snow being dumped, airborne winter dusts and snow, and winter rains were monitored for toxic metals, chlorides, phosphorus, sodium, and calcium. The data show that: (1) Phosphorus contents of snow were insignificant. (2) Soluble metal contents of snow compared with that of runoff. (3) Airborne dust is a major component of street snow residue. (4) The chloride value of snow was 3.1 ppm compared with 2.4 ppm for summer rain indicating that road salt is recycled into the air in winds. It is concluded that salting programs are essential for safety reasons, but salt must be used sparingly since the vast majority of salt eventually discharges into lakes and rivers regardless of disposal methods. However, as much snow as possible should be left at roadside. Heavy metal content of snow does not appear to be above that of the receiving waters. The fate of oils, greases, and toxic organics is only partially understood at the present time. (Little-Battelle)
W73-08601

A SURVEY OF LENTIC WATER WITH RESPECT TO DISSOLVED AND PARTICULATE LEAD,
Alaska Univ., College. Inst. of Water Resources.
D. Nyquist, L. A. Casper, and J. D. LaPerriere.
Available from the National Technical Information Service as PB-219 994, $3.00 in paper copy, $1.45 in microfiche. Completion Report No IWR-30, November 1972. 33p, 3 fig, 9 tab, 5 ref, append. OWRR A-035-ALAS (1).

Descriptors: *Lead, *Heavy metals, *Lentic environment, Bottom sediments, Plankton, Aquatic plants, *Alaska, *Ice fog, Lakes, Water pollution sources.
Identifiers: Fairbanks (Alas), Atomic adsorption spectrophotometry, Super cooled fog, Automobile combustion wastes.

Lead associated with automobile combustion is deposited on snow after adsorption onto ice fog particles in the Fairbanks, Alaska area. Fifty selected bodies of lentic water in the area were sampled for dissolved and particulate lead and for lead concentrations in the muds, plankton, and aquatic plants. Lead analysis was accomplished using a Perkin-Elmer Model 303 atomic adsorption spectrophotometer. Statistical analyses were carried out to determine correlations existing between the lead concentrations in the different fractions of each lake. Most correlations were highly significant (at the 99% probability level) except those between aquatic plant lead levels and the dissolved fraction, and between the dissolved fraction and the lead concentration in the nearby snow; these were both significant (at the 95% probability level) correlations. Additionally, no significant correlation was found between the lead levels in the net plankton and in the aquatic plants. An attempt was made to examine the lead concentrations for each fraction statistically, grouping the lakes according to areas of ice fog severity, to see if the fallout of the lead and its partitioning into the various fractions related to ice fog formation. Some evidence was found that this does occur. The limitations of the project are discussed in relation to the implications to human health.
W73-08604

ANALYSIS OF SELECTED EXISTING WATER QUALITY DATA ON THE CONNECTICUT RIVER,
Massachusetts Univ., Amherst. Dept. of Public Health.
A. J. Gross, and J. R. Folts.
Available from the National Technical Information Service as PB-219 981, $3.00 in paper copy, $1.45 in microfiche. Massachusetts Water Resources Research Center, Amherst, Publication no. 27, Completion Report (1973). 30p, 6 fig, 14 tab, 11 ref. OWRR A-055-MASS (1).

Descriptors: *Water data, Statistical methods, Water quality, *Regression analysis, Stream pollution, *Connecticut River, *Dissolved oxygen, Model studies, *Time series analysis, Computer programs, *Coliforms, Sampling.
Identifiers: Wilder (Vermont), Enfield (Conn), and Northfield (Mass), *Variance analysis.

A variety of statistical procedures was used to analyze data which measure water quality in the Connecticut River. The procedures included analysis of variance, regression and stepwise regression analyses and analyses of time series. The following observations may be made on the basis of the conclusions of the study: (1) Dissolved oxygen levels vary significantly among days and among sampling stations along the Connecticut River, (2) there was no significant variation in dissolved oxygen levels at either of the two sampling depths within a sampling station although there was a significant variation between the two depths, and (3) several different time series models and their requisite computer programs were developed in order to determine which model best fitted the six years of weekly coliform data available. From the time series analysis the coliform content is shown to be increasing from year to year. Finally, a model was developed using regression analysis to predict fecal coliform content from total coliform content.
W73-08605

HEATED DISCHARGE FROM FLUME INTO TANK - DISCUSSION,
Vanderbilt Univ., Nashville, Tenn. Dept. of Environmental and Water Resources Engineering.
For primary bibliographic entry see Field 08B.
W73-08610

A NEW TYPE OF WATER CHANNEL WITH DENSITY STRATIFICATION,
Johns Hopkins Univ., Baltimore, Md. Dept. of Mechanics and Materials Science.
G. M. Odell, and L. S. Kovasznay.
Journal of Fluid Mechanics, Vol 50, part 3, p 535-543, 1971. 5 fig, 7 ref.

Descriptors: *Stratification, *Density stratification, *Open channel flow, Velocity, Density, Conductivity, Mixing, Laboratory tests, Fluid mechanics, Flow characteristics, Distribution patterns.
Identifiers: *Flow visualization, Velocity profiles.

Existing laboratory facilities for experiments with stratified fluids are mainly of the density-stratified towing tank or wind tunnel type. The novel idea presented is based on using a disk pump to drive each fluid layer independently round a closed-return density-stratified water channel. A small-scale model was built and tested to demonstrate the feasibility of the idea. A hydrogen-bubble technique was used for both flow visualization and velocity measurement. Density measurements were made with an electrical conductivity probe developed by the authors. The tests have demonstrated the usefulness of such a facility, especially for longsteady-state experiments in density-stratified flows. (Oleszkiewicz-Vanderbilt)
W73-08615

TOPLYR-II A TWO-DIMENSIONAL THERMAL-ENERGY TRANSPORT CODE,
Hanford Engineering Development Lab., Richland, Wash.
D. C. Kolesar, and J. C. Sonnichsen, Jr.
Report HEDL-TME 72-46, March 1972. 49 p, 16 fig, 13 ref, 2 append. AEC-AT (45-1)-2170.

Descriptors: *Mathematical models, *Thermal pollution, *Heat transfer, *Heat, *Temperature, Thermal pollution, Water pollution, Energy, Algorithms, Meteorology, Diffusivity, Water temperature, Numerical analysis, Dispersion, Mixing.
Identifiers: *TOPLYR-II±MODEL, Eddy diffusivity, Thermal discharges, North Platte River, Thermal energy conservation.

TOPLYR-II describes, in certain types of rivers and lakes, the time varying transport of energy caused by the discharge and subsequent dissipation of condenser cooling water from electric power plants. The model flow field possesses a negligible vertical temperature gradient, and is located where the momentum source due to the plant discharge no longer affects the flow. TOPLYR-II is a modification of the TOPLYR code. As in TOPLYR, the mathematical formulation of the law of conservation of thermal-energy is employed to equate accumulation to convective

(via mean current), to diffusive and to source and sink terms. TOPLYR-II differs from TOPLYR primarily in that equations accurate to second-order rather than first-order have been employed to reduce errors due to numerical dispersion. The fluid depth is allowed to vary with position. The heat source is introduced as a temperature boundary condition which is permitted to change with time. An alternating-direction implicit algorithm is employed to solve the finite difference equations once velocity distribution, thermal eddy diffusivities, meteorological conditions, bottom contour, initial fluid temperature distribution and inlet fluid temperature (a function of time) are supplied. TOPLYR-II results compare favorably with field data. (Oleszkiewicz-Vanderbilt)
W73-08618

ENVIRONMENTAL ENGINEERING PROGRAMS QUARTERLY TECHNICAL PROGRESS REPORT JANUARY, FEBRUARY, MARCH 1972.
Hanford Engineering Development Lab., Richland, Wash.

Progress Report HEDL-TME 72-58, 1972. 25 p, 15 fig, 1 tab, 6 ref. AEC-AT (45-1)-2170.

Descriptors: *Temperature, *Mathematical models, *Heat, *Thermal powerplants, Rivers, Water pollution, Heat transfer, Mixing, Diffusion, Cooling, Heat transfer.
Identifiers: *Thermal discharges, *Cooling ponds, *Cooling capacity, Roanoke River, Pearl River, Tombigbee River.

Technical progress made by Westinghouse Hanford Company and its subcontractors during January, February and March 1972 is summarized. Programs covered include: (1) Simulation Modeling of Environmental Effects of Thermal Generation, (2) Regional Modeling of Surface Water Temperature from Projected Power Growth, and (3) Nuclear Plant Site Selection - Engineering Evaluation of Environmental Aspects. Previously published results of a sensitivity study associated with the undefined parameters of the TOPLYR-II program are updated. The program was modified to include variable thermal eddy diffusivity. Extension of TOPLYR-II to Potomac River data has necessitated consideration of local disturbances to the flow field such as islands. Low flow cooling capacities for the major river basins of the Eastern Gulf Coast and Southeastern Atlantic states were computed using the MAXPWR code. Techniques to aid in fog abatement and cooling pond technology are described briefly. (Oleszkiewicz-Vanderbilt)
W73-08619

ENVIRONMENTAL ENGINEERING PROGRAMS QUARTERLY TECHNICAL PROGRESS REPORT JULY, AUGUST, SEPTEMBER 1971.
Hanford Engineering Development Lab., Richland, Wash.

Report, HEDL-TME 71-165, November 1971. 45 p, 32 fig, 1 tab, 15 ref. AEC-AT (45-1)-2170.

Descriptors: *Temperature, *Mathematical models, *Heat, *Thermal powerplants, Rivers, Water pollution, Heat transfer, Mixing, Diffusion, Columbia River, Cooling.
Identifiers: *Thermal discharges, *Assimilative capacity, *Cooling capacity, Direct cooling capacity, Roanoke River, Tombigbee River, Pearl River.

Technical progress made by WADCO and WADCO subcontractors during July, August and September 1971 is summarized. The program is divided into three sections: (1) Simulation Modeling of Environmental Effects of Thermal Generation, (2) Regional Modeling of Surface Water Temperature from Projected Power Growths, and (3) Hydro-Environmental Evaluation of Nuclear Power Stations. A comparison of TOPLYR-II predictions with field data has demonstrated the capability of the code to simulate actual river data on the North Platte River. A transient flow routine was tested using data collected in the Columbia River Estuary and was added to the COLHEAT river simulation system. The MAXPWR code, used in calculating the cooling capacities of national waterways, has been modified to reduce the effort required to assemble input data and interpret program output and permit problems of greater complexity to be handled. Total and assimilative cooling capacities were calculated for 15 major rivers in the Eastern Gulf Coast and Southeastern Atlantic states. Thermal power plant intake structures and biological samplers are discussed briefly. (Oleszkiewicz-Vanderbilt)
W73-08620

THE COLHEAT RIVER SIMULATION MODEL.
Hanford Engineering Development Lab., Richland, Wash.

Report HEDL-TME 72-103, August 1972. 80 p, 20 fig, 4 tab, 23 ref. 3 append. AEC-AT (45-1)-2170.

Descriptors: Rivers, *Heated water, *Mathematical models, *Computer models, Electric power production, Thermal powerplants, *Thermal pollution, Water pollution, Discharge (Water), Theoretical analysis, Model studies, Computers, *Simulation analysis, Temperature, Flow, Meteorological data, Measurements, Evaluation, Heat budget, Heat transfer, Evaporation, Density.

The underlying theory, the development of the computer model, the result of various model tests and a brief user's guide for the Colheat River Simulation Model are presented. The model is formulated in terms of the far field resulting from the coarse grid normally employed. However, it has been proven quite flexible and capable of providing much of the fine structure. Routine operation of the system requires specification of: river or reservoir dimension reduced to equivalent nonparallel trapezoidal cross section; water temperature at the upstream end of the reach under study; stream flow information; and meteorological data. Special data are required for use of the transient flow routines and certain mixing options. Although the model was originally designed to simulate the thermal properties of a flowing water body, it has been used to model other pollutants. (Jerome-Vanderbilt)
W73-08624

RIVER JET DIFFUSER PLANNED.
For primary bibliographic entry see Field 05G.
W73-08631

URBAN STORMWATER QUALITY AND ITS IMPACT ON THE RECEIVING SYSTEM,
Rex Chainbelt, Inc., Milwaukee, Wis. Ecology Div.
For primary bibliographic entry see Field 05C.
W73-08635

THE MANAGEMENT OF GROUNDWATER RESOURCE SYSTEMS,
California Univ., Santa Barbara. Dept. of Mechanical Engineering.
For primary bibliographic entry see Field 05G.
W73-08660

GEOCHEMISTRY AND DIAGENESIS OF TIDAL-MARSH SEDIMENT, NORTHEASTERN GULF OF MEXICO,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 02J.
W73-08730

THE DISTRIBUTION AND TISSUE RETENTION OF MERCURY-203 IN THE GOLDFISH (CARASSIUS AURATUS),
Wayne State Univ., Detroit, Mich. Dept. of Biology.
For primary bibliographic entry see Field 05A.
W73-08761

DURATION OF VIABILITY AND THE GROWTH AND EXPIRATION RATES OF GROUP E STREPTOCOCCI IN SOIL,
Missouri Univ. Columbia. School of Veterinary Medicine.
J. A. Schmitz, and L. D. Olson.
Applied Microbiology, Vol 25, No 2, p 180-183, February 1973. 1 fig, 2 tab, 9 ref.

Descriptors: *Feedlots, *Streptococcus, *Soils, Separation techniques, Pollutant identification, Isolation, Water pollution sources.
Identifiers: *Survival, *Irradiation.

In irradiated and nonirradiated feedlot and pasutre soils inoculated with group E streptococci, the organism was not recovered 17 days postinoculation from either the irradiated or nonirradiated feedlot soils incubated at 37C, but survived in the irradiated pasture soils for 24 and 31 days postinoculation. The streptococci survived in irradiated and nonirradiated soils incubated at 4C for 116 days and in one irradiated feedlot soil for 165 days. The population of streptococci did not increase in either irradiated or nonirradiated soil, and the expiration rate was greater in the soils incubated at 37 and 25 C than at 4C. With the relatively prolonged druation of viability of group E streptococci in soil at 4C, it is suggested that soil contaminate with exudate from draining abscesses of infected swine could act as a source of infection during the colder season. (Little-Battelle)
W73-08774

MICROBIAL RESPONSE IN LOW TEMPERATURE WASTE TREATMENT,
Toronto Univ. (Ontario).
J. G. F. Henry.
Available in microfilm from National Library of Canada at Ottawa, Ph D Dissertation, 1971.

Descriptors: *Temperature, *Population, *Bacteria, *Separation techniques, *Sewage sludge, Growth rates, Model studies, Pathogenic bacteria, Sewage bacteria, Sewage treatment, Food abundance, Pseudomonas, Waste treatment, Waste water treatment.
Identifiers: Flavobacterium, Achromobacter, Vibrio, Mesophilic bacteria, Psychrophilic bacteria, Substrates, Gram stain.

The relationships between low temperature, psychrophilic population and microbial activity are clarified. Full scale treatment plants, batch studies and continuous laboratory models were used. Batch studies on pure cultures of 26 psychrophiles and 4 mesophiles were conducted at temperatures of 1,4,9.5, and 18 C with food (nutrient broth) in excess. A comparison of the temperature coefficients for the psychrophiles and the mesophiles revealed a significant difference between them. Continuously fed laboratory models with detention times of 2.4, 9.6, 24 and 96 hours were also investigated at the same temperatures as used in the batch tests. The proportion of psychrophilic bacteria in the continuous models proved to be a function mainly of termperature but also of detention. Microscopic examination, colonial characteristics, Gram-staining and other diagnostic tests were used on the mixed population from the models to show the variation in microorganisms with temperature and detention and also to identify to genus level the bacterial cultures isolated for the pure culture studies. Psychrophilic Pseudomonas, Flavobacterium, Achromobacter and Vibrio all occurred. In the batch tests, with unlimited food, yield decreased at colder temperatures. However, in the continuous experiments, where food was

limited, yield increased with colder temperature. Consideration of the relation of substrate concentration to detention, loading and other factors which moderate the effect of temperature on waste treatment systems led to the conclusion that temperature coefficients, like other activities in the system, must be a function of sbustrate concentration. (Little-Battelle)
W73-08797

THE LARGE VARIABILITY OF WATER QUALITY IN COASTAL WATERS AND SUGGESTIONS FOR HOW WE CAN HANDLE THEM,
Massachusetts Inst. of Tech., Cambridge.
For primary bibliographic entry see Field 02L.
W73-08804

PREDICTIVE MODELS OF SALINITY AND WATER QUALITY PARAMETERS IN ESTUARIES,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 02L.
W73-08815

THE COLUMBIA RIVER ESTUARY AND ADJACENT OCEAN WATERS, BIOENVIRONMENTAL STUDIES.
For primary bibliographic entry see Field 02L.
W73-08816

THE HISTORY OF HANFORD AND ITS CONTRIBUTION OF RADIONUCLIDES TO THE COLUMBIA RIVER,
Battelle Memorial Inst., Richland, Wash. Pacific Northwest Labs.
For primary bibliographic entry see Field 02L.
W73-08817

PHYSICAL ASPECTS OF THE COLUMBIA RIVER AND ITS ESTUARY,
Oregon State Univ., Corvallis. Dept. of Oceanography.
For primary bibliographic entry see Field 02L.
W73-08818

CIRCULATION AND SELECTED PROPERTIES OF THE COLUMBIA RIVER EFFLUENT AT SEA,
Washington Univ., Seattle. Dept. of Oceanography.
For primary bibliographic entry see Field 02L.
W73-08819

CHEMICAL BUDGET OF THE COLUMBIA RIVER,
Oregon State Univ., Corvallis. Dept. of Oceanography.
For primary bibliographic entry see Field 02L.
W73-08821

RIVER-OCEAN NUTRIENT RELATIONS IN SUMMER,
Geological Survey, Menlo Park, Calif. Water Resources Div.
For primary bibliographic entry see Field 02L.
W73-08823

RIVER-OCEAN SUSPENDED PARTICULATE MATTER RELATIONS IN SUMMER,
Geological Survey, Menlo Park, Calif. Water Resources Div.
For primary bibliographic entry see Field 02L.
W73-08824

ASPECTS OF MARINE PHYTOPLANKTON STUDIES NEAR THE COLUMBIA RIVER, WITH SPECIAL REFERENCE TO A SUBSURFACE CHLOROPHYLL MAXIMUM,
Washington Univ., Seattle. Dept. of Oceanography.
For primary bibliographic entry see Field 02L.
W73-08826

DISTRIBUTION OF ORGANIC CARBON IN SURFACE SEDIMENT, NORTHEAST PACIFIC OCEAN,
Washington Univ., Seattle. Dept. of Oceanography.
For primary bibliographic entry see Field 02L.
W73-08828

STUDIES OF THE AEROBIC, NONEXACTING, HETEROTROPHIC BACTERIA OF THE BENTHOS,
Georgia Univ., Athens. Dept. of Microbiology.
For primary bibliographic entry see Field 02L.
W73-08830

RADIOACTIVE AND STABLE NUCLIDES IN THE COLUMBIA RIVER AND ADJACENT NORTHEAST PACIFIC OCEAN,
Puerto Rico Nuclear Center, Mayaguez.
For primary bibliographic entry see Field 02L.
W73-08842

RADIONUCLIDE DISTRIBUTION IN COLUMBIA RIVER AND ADJACENT PACIFIC SHELF SEDIMENTS,
Puerto Rico Nuclear Center, Mayguez.
For primary bibliographic entry see Field 02L.
W73-08843

SEDIMENT-ASSOCIATED RADIONUCLIDES FROM THE COLUMBIA RIVER,
State Univ. of New York, Stony Brook. Marine Sciences Research Center.
For primary bibliographic entry see Field 02L.
W73-08844

SEASONAL AND AREAL DISTRIBUTIONS OF RADIONUCLIDES IN THE BIOTA OF THE COLUMBIA RIVER ESTUARY,
Oregon State Univ., Corvallis. Dept. of Oceanography.
For primary bibliographic entry see Field 02L.
W73-08846

TOTAL PHOSPHORUS AND PHOSPHORUS-32 IN SEAWATER, INVERTEBRATES, AND ALGAE FROM NORTH HEAD, WASHINGTON,
Washington Univ., Seattle. Coll. of Fisheries; and Washington Univ., Seattle. Lab. of Radiation Ecology.
For primary bibliographic entry see Field 02L.
W73-08847

ORGANIC FILMS ON NATURAL WATERS: THEIR RETRIEVAL, IDENTIFICATION, AND MODES OF ELIMINATION,
Cornell Aeronautical Lab., Inc., Buffalo, N.Y.
R. E. Baier.
Journal of Geophysical Research, Vol 77, No 27, p 5062-5075, September 20, 1972. 5 fig, 1 tab, 16 ref.

Descriptors: *Air-water interfaces, *Path of pollutants, *Oily water, *Bubbles, Biodegradation, Water analysis, Gas chromatography, Spectrophometry, Water quality, Infrared radiation, Ultraviolet radiation, New York.
Identifiers: *Lake Chautauqua (NY).

Air-water interfacial films were sampled and analyzed by infrared spectroscopy. A field program on Lake Chautauqua in western New York correlated the buildup of oily films over the lake surface with peak boating activity and demonstrated the rapid elimination of such pollutant layers by natural mechanisms. Bubble breaking and its concomitant ejection of film fragments into the air was by far the most efficient process, especially when simultaneous irradiation accelerated the formation of polar moieties in the films. Chemical fractionation also occurs by this mechanism, with the more polar organic components and their associated inorganic elements being stripped from the interface preferentially. Thus, air-sea interfacial films are implicated in sea-to-air material transport and in the chemistry of marine aerosols. (Knapp-USGS)
W73-08851

EFFECT OF VARIOUS SALTS ON THE SURFACE POTENTIAL OF THE WATER-AIR INTERFACE,
Naval Research Lab., Washington, D.C.
For primary bibliographic entry see Field 02K.
W73-08859

OUR KNOWLEDGE OF THE PHYSICO--CHEMISTRY OF AEROSOLS IN THE UNDISTURBED MARINE ENVIRONMENT,
Max Planck-Institut fur Chemie, Mainz (West Germany).
C. E. Junge.
Journal of Geophysical Research, Vol 77, No 27, p 5183-5200, September 20, 1972. 11 fig, 3 tab, 48 ref.

Descriptors: *Aerosols, *Sea water, *Salts, Geochemistry, Distribution patterns, Dusts, Path of pollutants, Particle size, Sampling.

A survey is given of present knowledge of marine aerosols. On the basis of the aerosol size distribution in undisturbed marine environments, five different components of the aerosol are discussed: particles with radii larger than 20 microns sea spray particles, tropospheric background particles, mineral dust particles, and particles with radii smaller than 0.03 microns. The troposphere over the oceans is filled with a fairly uniform background aerosol on which the sea spray aerosol is superimposed only within the lowest kilometers above the sea surface. The sea spray component is discussed in detail with respect to size distribution, production, and chemical composition. The various components of the background aerosol seem to be either of continental origin or produced within the atmosphere. New data are presented on the mineral dust component over the Atlantic Ocean that originates from the Sahara. (Knapp-USGS)
W73-08860

1971 WATER RESOURCES DATA FOR NEW YORK: PART TWO, WATER QUALITY RECORDS.
Geological Survey, Albany, N.Y.
For primary bibliographic entry see Field 07C.
W73-08890

TREATMENT OF URBAN RUNOFF.,
Environmental Protection Agency, Washington, D.C. Municipal Pollution Control Section.
For primary bibliographic entry see Field 05G.
W73-08898

WATER QUALITY TRENDS IN INSHORE WATERS OF SOUTHWESTERN LAKE MICHIGAN,
Metropolitan Sanitary District of Greater Chicago, Ill.
W. G. Schmeelk, E. W. Knight, and C. Lue-Hing.
Presented at the Illinois Institute of Technology Symposium on Water Pollution in Metropolitan

Areas, Chicago, Illinois, November 30, 1972. 26 p, 9 fig, 10 ref.

Descriptors: *Water quality, *Lake Michigan, *Data collections, Water pollution, Chemical analysis, Water quality control, Water pollution control, Domestic wastes, Water analysis, Water pollution sources.
Identifiers: *Water quality trends.

The quality of Lake Michigan water is of great concern to public health officials and scientists, especially to the Metropolitan Sanitary District of Greater Chicago. With the establishment of the Sanitary District by State of Illinois Statue, the District was given authority to prevent discharges of any type into the Lake in its geographical area of jurisdiction. Waste discharges flow to the Chicago River, a former tributary of Lake Michigan, but the flow of the River has been reversed to prevent waste discharges to the Lake. An extensive testing program of Lake water quality has been set up by the District to determine water quality deterioration from discharges outside the Districts authority. Over 20 such monitoring stations are in existence and thirty water quality parameters are measured at each station. The data of four such stations are examined in depth with emphasis on plankton and diatom counts. Water quality of Lake Michigan is changing with time. Sulfates and chlorides are increasing, calcium levels are remaining almost constant, and sodium and potassium levels are declining somewhat. Domestic wastes are occasionally a problem and nitrogen and phosphorus are sufficient to support large algae growths. (Poertner)
W73-08899

CESIUM KINETICS IN A MONTANE LAKE ECOSYSTEM,
Colorado State Univ., Fort Collins.
T. E. Hakonson.
Available form Univ. Microfilms, Inc., Ann Arbor, Mich. 48106 Order No. 73-2791. Ph D Dissertation, 1972. 166 p.

Descriptors: *Path of pollutants, *Kinetics, Ecosystems, *Neutron activation analysis, *Radiochemical analysis, Water analysis, Lake sediments, Seston, Amphipoda, Zooplankton, Trout, *Colorado, Aquatic plants, Aquatic life, Absorption, Bottom sediments, Tracers.
Identifiers: *Cs-133, *East Twin Lake (Colo), Montane Lake, Bioaccumulation, Cesium radioisotopes, Cs-137, Scuds, Fate of pollutants.

The kinetics of cesium were determined in East Twin Lake, a 5 hectare, natural semi-drainage lake which lies at an elevation of 2880 meters in the north-central Colorado Rockies. One kilogram of Cs-133 was introduced into the water of East Twin Lake on September 15, 1970. Samples of water, seston, sediment, amphipods, zooplankton, trout and three species of vegetation were obtained over a 393 day period following the dosing event. Stable cesium was measured by neutron activation analysis. Loss of Cs-133 from the water occurred in a rapid phase, which resulted in the loss of 60 percent of the cesium from water and had a loss half-time of 0.5 days and a slow phase which had a loss half-time of 130 days. The seston fraction of each water sample contained from 25 percent to 80 percent of the Cs-133 present in each liter of unfiltered water. Bottom sediments were identified as the major site of deposition of the Cs-133 dose. Amphipods and zooplankton reached equilibrium with the water within about three weeks after the Cs-133 administration and achieved concentration factors of about 700 and 150, respectively. Trout accumulated the Cs-133 more slowly than the invertebrates and reached a maximum concentration factor of about 5500 some 260 days following the dosing event. The simulation of the kinetics of Cs-133 in the East Twin Lake ecosystem was approached by utilizing the observed in-growth data to solve for the intercompartmental transfer rate constants. The constant coefficient model described the general behavior of the observed data very well. The use of Cs-133 as a tracer for Cs-137 was both reliable and feasible. Absolute quantities as small as 0.01 micrograms of Cs-133 were detectable. Concentrations of Cs-133 and fallout Cs-137 in trout muscle were significantly correlated which indicated that the kinetic behavior of the isotopes was similar. (Holoman-Battelle)
W73-08901

LAND DEVELOPMENT AND HEAVY METAL DISTRIBUTION IN THE FLORIDA EVERGLADES,
Florida State Univ., Tallahassee, Dept. of Oceanography.
G. J. Horvath, R. C. Harriss, and H. C. Mattraw.
Marine Pollution Bulletin, Vol 3, No 12, p 182-184, December 1972. 1 fig, 3 tab, 13 ref.

Descriptors: *Manganese, *Cobalt, *Copper, *Zinc, *Cadmium, *Lead, *Hydrologic systems, *Estuaries, Agricultural runoff, Water pollution sources, Water analysis, Land development, Heavy metals, Water sampling, Estuarine environment, Pollutant identification, Florida, Chemical analysis.
Identifiers: *Florida Everglades, Atomic absorption spectrophotometry, Barron River, Chokoloskee Bay, Lastman Bay, Barron River Canal, Sample preparation, Precision, Accuracy.

In order to make a quantitative appraisal of Big Cypress land development on the distribution and abundance of heavy metals in the Everglades estuaries, a study was conducted to elucidate the geochemistry of manganese, cobalt, copper, zinc, cadmium and lead in the canal-estuary system of the region. The hydrological system chosen for the study consists of farmed lands to the north connected by the Barron River canal system of Chokoloskee Bay to the south. Water samples were collected during moderate to high flow conditions, iced, filtered, and subjected to nitric acid-persulfate oxidation. Total dissolved metals were concentrated using Chelex-100 ion-exchange resin columns with an efficiency of 80-100 percent. Metal concentrations were determined by atomic absorption spectrophotometry, using the standard addition method for all samples. Analytical precision was between plus or minus 2 and 8 percent. The highest concentration of total dissolved metals occurred in the portion of the canal adjacent to cultivated areas. Data demonstrate that Chokoloskee Bay is enriched in the metals investigated by factors of 2.6-4.8. A comparison of dissolved metal concentrations in the developed canal area with water from estuarine areas indicates that copper, cadmium, and lead exhibit maximum concentrations in Chokoloskee Bay. Both of the Everglades estuaries investigated have higher dissolved Mn, Co, Cd, and Pb contents than have been previously reported for coastal marine waters. (Holoman-Battelle)
W73-08906

DECOMPOSITION OF OIL POLLUTANTS IN NATURAL BOTTOM SEDIMENTS,
Rutgers - The State Univ., New Brunswick, N.J.
T. B. Shelton.
Available from Univ. Microfilms, Inc., Ann Arbor, Mich. 48106. Order No. 73-4778. Ph D Dissertation, 1972. 165 p.

Descriptors: *Degradation (Decomposition), *Oil, *Bottom sediments, Pollutants, Rivers, *Aerobic conditions, *Anaerobic conditions, Soil analysis, Aquatic soils, Persistence, Chromatography, Pollutant identification, Consolidation, Oil pollution, Organic compounds, Separation techniques, Dissolved oxygen, Biochemical oxygen demand, Chemical oxygen demand, Hydrogen ion concentration, Color, Hydrogen sulfide, Nitrogen, Phosphorus, Solvent extractions.
Identifiers: *Fate of pollutants, Infrared spectrophotometry, Chemical composition, Degradation products, Hydrocarbons, Organic carbon, Total organic carbon, Organic solvents, Hexane, Benzene, Volatile solids.

An aerobic and anaerobic experimental system was designed to study the decomposition of oil pollutants in natural bottom sediments and to answer 3 questions: (1) What is the relative persistence of oils compared with other organics from a natural bottom sediment containing oil. The relative persistence of aliphatic, aromatic and oxy-compound components of the oil were also determined; (2) How is this relative persistence influenced by anaerobic conditions in the overlying water. and (3) Is organic carbon released from a natural bottom sediment during the decomposition process. The aerobic system was a constant flow apparatus and the anaerobic system operated on a fill and draw basis with nitrogen gas used to achieve anaerobic conditions. A suitable bottom sediment containing approximately 8 percent oil on a dry weight basis was used. Appropriate samples of the sediment were placed on the aerobic and anaerobic experimental systems and the decomposition followed for a 33 week period. At weekly intervals dissolved oxygen, pH, TOC, BOD were measured on the aerobic system. H2S, pH, COD, TOC, and color were determined on the anaerobic system. Dry solids, volatile solids, nitrogen, phosphorus, hexane extractables, benzene extractables were measured on the bottom sediment. The hexane extractable oils were subjected to chromatographic separation using a silica gel technique. These fractions were examined by infrared spectrophotometry for changes in functional groups. It was found that: (1) the oxygen utilization rate of the sediment varied from 1.5 to 1.73 g/sq m/day; (2) oils are lost and there is a steady release of organic C from natural bottom sediments with time with both aerobic and anaerobic conditions present in the overlying water; (3) under aerobic conditions oils persist in the bottom sediment longer than do other organics. Under anaerobic conditions, the reverse seems to be true; (4) natural bottom sediments containing oil consolidate under their own weight with time; (5) oils which reach the bottom sediments of rivers and other water bodies have lost all their lighter fractions corresponding to a carbon chain length of 20; and (6) there is an increased percentage of partially oxidized hydrocarbons in oils extracted from natural bottom sediments. (Holoman-Battelle)
W73-08911

THE DISTRIBUTION, SUBSTRATE SELECTION AND SEDIMENT DISPLACEMENT OF COROPHIUM SALMONIS (STIMPSON) AND COROPHIUM SPINICORNE (STIMPSON) ON THE COAST OF OREGON,
Oregon State Univ., Corvallis.
J. E. McCarthy.
Available from Univ. Microfilms, Inc., Ann Arbor, Mich. 48106. Order No. 73-7840. Ph D Dissertation, 1973. 68 p.

Descriptors: *Distribution patterns, Habitats, *Sediments, Laboratory tests, Amphipoda, Salinity, Population, Sands, *Oregon.
Identifiers: *Corophium spinicorne, *Corophium salmonis, *Substrate selection, Substrates, Macroinvertebrates, Scuds, Arthropods.

The amphipoda, Corophium salmonis (Stimpson) and C. spinicorne (Stimpson) were examined from three aspects. The first study involved the distribution and natural habitat of these species on the Oregon coast. Both species were found in fresh-water (less than 0.4 percent salinity) and in estuarine water up to 1.0 percent salinity (C. spinicorne) and 2.9 percent salinity (C. salmonis). Both species disappeared in winter months, reoccurring in increasing numbers during spring months and reaching highest densities in the

summer. Under natural conditions C. salmonis was found most frequently in mud sediments while C. spinicorne occurred more often in sand. Both species formed burrows in sediments and tubes upon submerged surfaces. The second study was to determine how specific these animals were in selecting substrates. The animals were exposed simultaneously to their native sediments, acid-cleaned sand and a foreign mud or sand. These multiple choice experiments demonstrated that these species of Corophium can readily determine their native substrate. Both species, when occurring in sand, could distinguish the native sand from similar sand of other areas. The third study determined the amount of material removed when the animal established. The average for both species was 0.07977 gm (0.032 ml)/burrow. (Little-Battelle)
W73-08912

NUTRIENT PATHWAYS IN SMALL MOUNTAIN STREAMS,
Georgia Univ., Athens.
W. R. Woodall, Jr.
Available from Univ. Microfilms, Inc., Ann Arbor, Mich. 48106. Order No. 73-5809. Ph D Dissertation, 1972. 139 p.

Descriptors: *Nutrients, *Biodegradation, *Decomposing organic matter, *Leaves, *Cycling nutrients, *Benthic fauna, Detritus, Potassium, Calcium, Magnesium, Crayfish, Salamanders, Path of pollutants, Streams, Leaching, Invertebrates, Surface runoff.
Identifiers: Biotransformation, Macroinvertebrates.

Population sizes of benthic organisms in streams draining four small watersheds were estimated. The watersheds, which were located in the southern Appalachian mountains, were each covered in a different vegetation type. Microflora were not included in the model which was devised. Grazers performed a minor function in Coweeta's small, shaded streams. Crayfish and salamanders were responsible for most of the standing crops biomass in the detritivore and predator compartments respectively and also account for most of the fluxes in their compartments. They are important in small stream nutrient flow by forming a sink in the remineralization process. An increase in potassium concentrations and a decrease in calcium and magnesium concentrations was associated with an increase in trophic levels. Since the food material was richer in calcium and magnesium than potassium, detritivores concentrated proportionately more potassium than calcium or magnesium. Some insects showed a positive correlation between calcium concentrations and degree of sclerotization. An inverse relationship between potassium concentration and degree of sclerotization was even more pronounced. Most taxa, however, showed neither the positive correlation with calcium nor the inverse relation with potassium. The principal mechanism of potassium release from detritus was through leaching. For calcium and magnesium, which are chemically bound in leaf tissue, the principal mechanism for release was the feeding activity of detritivores. Streams are important in the watersheds because they are the primary mechanism for nutrient removal from the system. (Little-Battelle)
W73-08915

STATISTICAL METHODS FOR THE DETECTION OF POLLUTION UTILIZING FISH MOVEMENTS,
Virginia Polytechnic Inst. and State Univ., Blacksburg.
J. W. Hall.
Available from Univ. Microfilms, Inc., Ann Arbor, Mich. 48106. Order No. 73-5872. Ph D Dissertation, 1973. 114 p.

Descriptors: *Zinc, *Statistical methods, *Monitoring, *Pollutant identification, *Fish behavior, Movement, Heavy metals, Stochastic processes, Mathematical studies, Water pollution effects, Fish physiology.
Identifiers: Camp-Paulson approximation.

A statistical technique was developed for using fish movement patterns measured by light beam interruptions to continuously monitor water for the presence of zinc. The sequence of light beam interruptions per hour, which is the realization of a stochastic process, was studied by analyzing some of Waller's (1971) data. It was determined that the mean of the process varied with time, having a twenty-four hour cycle and that the observations were serially correlated. Although a shortage of data prevented a firm conclusion, it was decided provisionally that the observations for a single hour were distributed negative binomially. Using the Camp-Paulson approximation as a transformation and making some additional assumptions allowed the process to be transformed to a strictly stationary one for which critical values could easily be calculated. The procedure was compared with Waller's method both on the data which had been analyzed and on some additional data. The procedure worked as well as Waller's method for low concentration of zinc and detected the presence of zinc faster when the concentration was high. The procedure allowed some statement about the probability of the errors involved whereas Waller's method did not. (Holoman-Battelle)
W73-08924

RESULT OF FLUVIAL ZINC POLLUTION ON THE ZINC CONTENT OF LITTORAL AND SUB-LITTORAL ORGANISMS IN CARDIGAN BAY, WALES,
University Coll. of Wales, Aberystwyth. Dept. of Zoology.
M. P. Ireland.
Environmental Pollution, Vol 4, No 1, p 27-35, January 1973. 2 fig, 4 tab, 19 ref.

Descriptors: Chemical analysis, *Zinc, *Path of pollutants, *Pollutant identification, *Ecological distribution, Water analysis, Kelp, Littoral, Tidal effects, Mollusks, Crustaceans, Food habits, Sampling, Methodology, Sea water, Marine animals, Marine algae, Water sampling, Heavy metals, Scuba diving, Invertebrates, Clams, Snails, Gastropods, Mussels, Flow, Freshwater.
Identifiers: Atomic absorption spectrophotometry, Macroinvertebrates, Sponges, Sublittoral, Sample preparation, Fucus vesiculosus, Barnacles, Littorina littorea, Mytilus edulis, Actinia equina, Thais lapillus, Balanus balanoides, Halichondria panicea, Tunicates, Botryllus schlosseri, *Wales, *Cardigan Bay.

A study has been made of the distribution of fluvial zinc in sea water, five littoral animals and one species of seaweed, together with two sub-littoral animals at varying distances from the source of pollution. Water samples were taken 15 cm below the surface, and filtered. Fresh water samples were concentrated 50 times by boiling and acidifying with HCl (Aristar, BDH) to a concentration of 0.06 N. Sea water samples were concentrated with organic solvents, as described by Willis (1961). Littoral animals were collected in the area where kelp was located and sublittoral species were collected at a low spring tide by SCUBA divers. Allowed to purge themselves overnight, the animal samples were rinsed in distilled water, dried at 105C to a constant weight, pulverized, and digested in 6 N HCl. Whole-bodied specimens were used except for a species of barnacle and the kelp. Zinc was estimated by AAS at 214 nm. The Zn content of sea water was indicative of polluted water becoming progressively more dilute. The distribution of Zn in the various species was found to be related to tidal flow, diet, and species specificity for the metal. (Holoman-Battelle)
W73-08925

A. THE ROLE OF LICHENS IN ROCK WEATHERING AND SOIL FORMATION. B. MERCURY IN SEDIMENTS,
Wisconsin Univ., Madison.
I. K. Iskandar.
Available from Univ. Microfilms, Inc., Ann Arbor, Mich. 48106. Order No. 72-24,886. Ph D Dissertation, 1972. 177 p.

Descriptors: *Path of pollutants, *Mercury, *Sediments, *Soils, *Lichens, Lakes, Sewage, Iron, Heavy metals, Water pollution sources, Aluminum, Calcium, Magnesium, Solubility, *Wisconsin.
Identifiers: Mobilization, Sample preparation, *Atomic absorption spectrophotometry, Chemical recovery.

Results showed that low but significant amounts of lichen compounds dissolve in water. Lichen compounds and water solutions of lichen compounds formed soluble metal complexes, frequently colored, when shaken with silicate materials for 96 hours, as shown by spectrophotometric and chemical analyses of the extracts. Release of cations from the silicate materials resulted largely from metal-complex formation rather than from reactions directly involving hydrogen ions. Similar amounts of Fe, Al, Ca, and Mg were released from the silicates by water solutions of lichen compounds and by solid lichen compounds. Contrary to popular belief, lichen compounds are sufficiently soluble in water to form soluble metal complexes and to cause chemical weathering of minerals and rocks. A highly sensitive and precise procedure was developed for the quantitative determination of total Hg in sediments and soils. Undried samples were treated with concentrated HNO3/H2SO4, KMnO4, and K2S2O8 for digestion and oxidation of all forms of Hg to Hg2 plus, which is subsequently determined by flameless atomic absorption spectrophotometry. Recovery of Hg ranged from 98 to 105 percent. The developed procedure extracted more Hg from sediments and soils than did extraction with concentrated HNO3. The vertical distribution of Hg in sediment cores from a range of hard- and soft-water lakes in Wisconsin was evaluated in terms of potential sources of Hg during the nineteenth and twentieth centuries. For the Madison lakes, the trends in Hg distribution were related to variations in sewage inputs during the last 80 years. It is unlikely that either inputs of sewage or erosional products are responsible for the observed accumulation of Hg. Background levels varied from 0.06 to 0.24 ppm of Hg in precultural sediments from the Wisconsin lakes investigated. (Little-Battelle)
W73-08930

PHOSPHORUS DYNAMICS IN LAKE WATER,
Toronto Univ. (Ontario). Dept. of Zoology.
D. R. S. Lean.
Science, Vol 179, No 4074, p 678-680, February 16, 1973. 2 fig, 14 ref.

Descriptors: *Cycling nutrients, *Phosphorus, *Metabolism, *Plankton, *Organophosphorus compounds, Nutrients, Phosphates, Absorption, Lakes, Separation techniques, Path of pollutants.
Identifiers: *Excretion, *Gel filtration, Heart Lake, Canada, Colloids, Biotransformation.

Radioactive phosphate was used in conjunction with gel filtration to identify biologically important forms of P in lake water and the rate constants for their formation. Water samples from Heart Lake (Ontario), a small eutrophic lake, were spiked with tagged phosphate, filtered, and analyzed. The experiments revealed that a steady state is rapidly attained between tagged P and lake water in the summer with the following composition: a particulate fraction containing the bulk of the P plus small amounts of a soluble high-molecular-weight organic P compound; a low-molecular-weight organic P compound; and soluble inorganic phosphate, the turnover time of which is very

short. It is concluded that an exchange mechanism exists in lake water between phosphate and plankton, but the excretion of an organic phosphorus compound by the plankton is also a significant process. It results in the extracellular formation of a colloidal substance, and most of the nonparticulate phosphorus in lake water is in this form. (Little-Battelle)
W73-08931

MICROBIAL DEGRADATION OF PARATHION,
Mississippi State Univ., State College.
W. L. Gibson.
Available from Univ. Microfilms, Inc., Ann Arbor, Mich. 48106 Order No. 73-168. Ph D Dissertation, 1972. 125 p.

Descriptors: *Microbial degradation, *Phosphothioate pesticides, *Metabolism, Biochemistry, Biodegradation, Organophosphorus pesticides, Phenols, Alcohols, Hydrogen ion concentration, Temperature, Pollutant identification, Aerobic bacteria.
Identifiers: *Metabolites, *Pseudomonas aeruginosa, Substrate utilization, *Parathion, Fate of pollutants, Ethanol, Growth, Bacterial physiology, Thin layer chromatography, Paraoxon, p-Nitrophenol, p-Aminophenol, Organic solvents.

An organism capable of utilizing parathion as the sole carbon and energy source was isolated by enrichment culture techniques. The bacterium was characterized and tentatively classified as Pseudomonas aeruginosa. A pH of 7.0 - 7.5 and temperature of 30 C were optimum for the consumption of parathion. Virtually no oxygen utilization was observed with resting cell suspensions when nonsolubilized parathion was employed. The use of ethanol as solvent for parathion in resting cell studies or preincubation of cells in ethanol obviated this problem and rapid parathion oxidation was demonstrable. Approximately 80 percent of the parathion consumed by resting cells was present terminally as carbon dioxide. Permeability of the cell to parathion or its metabolites was contingent upon the use of ethanol as either solvent or denaturant. The nature of the enzyme system in parathion utilization was constitutive. Enhanced parathion utilization was noted when grown in a carbon-dioxide-enriched atmosphere. The isolate was capable of growth on parathion, paraoxon, p-nitrophenol, p-aminophenol, and phenol. Metabolites were tentatively identified by thin layer chromatography. Thin layer chromatographic data generally supported the growing evidence for the proposed pathway of parathion metabolism. (Holoman-Battelle)
W73-08932

GAGING AND SAMPLING INDUSTRIAL WASTEWATERS,
Calgon Corp., Pittsburgh, Pa.
For primary bibliographic entry see Field 05A.
W73-08935

REGROWTH OF COLIFORMS AND FECAL COLIFORMS IN CHLORINATED WASTEWATER EFFLUENT,
Hadassah Medical School, Jerusalem (Israel). Environmental Health Lab.
For primary bibliographic entry see Field 05C.
W73-08939

ISOLATION OF BACTERIA CAPABLE OF UTILIZING METHANE AS A HYDROGEN DONOR IN THE PROCESS OF DENITRIFICATION,
National Inst. for Water Research, Pretoria (South Africa).
For primary bibliographic entry see Field 05A.
W73-08941

A NOTE ON THE IRON-ORGANIC RELATIONSHIP IN NATURAL WATER,
Wisconsin Univ., Madison. Water Chemistry Program.
R. H. Plumb, Jr., and G. F. Lee.
Water Research, Vol 7, No 4, p 581-585, April 1973. 2 fig, 3 tab, 7 ref. EPA-5T1-WP-22.

Descriptors: *Iron, Separation techniques, *Organic compounds, *Colorimetry, Heavy metals, Water analysis, Organic matter, *Wisconsin.
Identifiers: *Fractionation, *Gel filtration, Preconcentration, *Lake Mary (Wis), Sample preparation.

Water samples were collected at the 15 m depth of Lake Mary, a small, highly colored meromictic lake in Wisconsin, for use in studies of iron-organic relationships. Most of the samples were fractionated on a Sephadex G-25 fine column. Iron concentrations were determined by a colorimetric method using 2,4,6-tripyridal-s-triazine (TPTZ). Organic matter was monitored with a fluorometer. The iron elution pattern for the Sephadex column was investigated using two approaches. The first consisted of passing ionic iron through the column and determining recovery of iron in the effluent. The second consisted of tying up the iron with a complexing agent and determining the amount that would pass through the column. The results showed that complexed iron, that associated with organic matter, could not pass through the column. A second approach in which natural water was treated with TPTZ strengthened the observation. It is concluded that gel filtration is potentially useful for evaluating organic-inorganic interactions. However, the use of concentrated samples distorts and overemphasizes the importance of the iron-organic systems in the environment. The use of unconcentrated samples with Sephadex columns should be a means for evaluating the amount of iron associated with organic matter. (Little-Battelle)
W73-08945

SORPTION OF COPPER ON LAKE MONONA SEDIMENTS - EFFECT OF NTA ON COPPER RELEASE FROM SEDIMENTS,
Wisconsin Univ., Madison. Water Chemistry Program.
I. Sanchez, and G. F. Lee.
Water Research, Vol 7, No 4, p 587-593, April 1973. 6 fig, 2 tab, 4 ref. EPA-5T1-WP-22.

Descriptors: *Sediments, Iron, *Copper, Manganese, *Nitrilotriacetic acid, Carbonates, *Leaching, *Sorption, Heavy metals, Sulfides, Alkalinity, Calcium, Magnesium, *Wisconsin.
Identifiers: Binding capacity, Mobilization, *Lake Monona (Wis).

Sediment samples from Lake Monona, Wisconsin were dried and solutions prepared in flasks by adding distilled water and a standard solution of Cu. The solutions were shaken for 24 hr, left to stand for 12 hr, and/or centrifuged through membrane filters and the filtrate analyzed for copper. Wet sediment was also aerated by shaking for one month to oxizide Fe, Mn, sulfide, and organics to determine their effect on the binding capacity of the sediment for copper. Additional studies were conducted with large quantities of NTA added to sediment solutions to determine its effect on the release of heavy metals. Copper, iron, and manganese were determined by AA after 24 hr of contact. The results show that the binding capacity of Cu by Lake Monona sediments is primarily related to the alkalinity (Ca, Mg carbonates present in the sediments). Apparently organics and sulfides play a minor role in binding copper to sediments; in the case of sulfides most probably for reasons of low content rather than for reasons of solubility of cupric sulfides. Over very dilute copper solutions, sulfide in the sediment should control the binding mechanism. The sediments investigated show a relatively large binding capacity amounting to approximately 26 mg of copper being fixed per gram of dry sediments. The addition of large amounts of NTA to Lake Monona sediments resulted in an increase in the amounts of iron and manganese leached from the sediments. However, the copper released from the sediments decreased with increasing NTA. (Little-Battelle)
W73-08946

TRACE METAL RELATIONSHIPS IN A MARINE PELAGIC FOOD CHAIN,
Stanford Univ., Calif.
For primary bibliographic entry see Field 05C.
W73-08947

TOXIC EFFECTS OF CUPRIC, CHROMATE AND CHROMIC IONS ON BIOLOGICAL OXIDATION,
Calgary Univ. (Alberta). Dept. of Chemical Engineering.
For primary bibliographic entry see Field 05C.
W73-08948

MASS AND MONOXENIC CULTURE OF VORTICELLA MICROSTOMA ISOLATED FROM ACTIVATED SLUDGE,
Tokyo Univ. (Japan). Inst. of Applied Microbiology.
For primary bibliographic entry see Field 05A.
W73-08950

THE USE OF COLIPHAGE AS AN INDEX OF HUMAN ENTEROVIRUS POLLUTION IN AN ESTUARINE ENVIRONMENT,
New Hampshire Univ., Durham.
For primary bibliographic entry see Field 05A.
W73-08951

STUDIES ON THE OCCURRENCE, PHYSIOLOGY, AND ECOLOGY OF BIOLUMINESCENCE IN DINOFLAGELLATES,
Oregon State Univ., Corvallis.
For primary bibliographic entry see Field 05C.
W73-08953

A COMPARATIVE STUDY OF THE DECOMPOSITION OF CELLULOSIC SUBSTRATES BY SELECTED BACTERIAL STRAINS,
Massachusetts Univ., Amherst.
M. C. Segal.
Available from Univ. Microfilms, Inc., Ann Arbor, Mich. 48106 Order No. 73-6723. Ph D Dissertation, 1972. 141 p.

Descriptors: *Microbial degradation, *Cellulose, *Degradation (Decomposition), Cultures.
Identifiers: *Viscometric techniques, Cellulomonas, Cellvibrio, Cytophaga, Bacillus, *Bacterium, Pseudomonas, Arthrobacter, *Substrates, Vibrios, Cotton cellulose, Cotton linters, Wood cellulose, Hydroxethyl cellulose, Carboxymethyl cellulose.

The decomposition of cellulosic materials by cultures of aerobic mesophilic bacteria was investigated using viscometric techniques. Substrates for decomposition studies included insoluble cotton celluloses of various Degrees of Polymerization, raw cotton linters, wood cellulose, hydroxethyl cellulose and soluble carboxymethyl celluloses of various Degrees of Polymerization and Degrees of Substitution. Viscometric methodologies were readily adaptable for quantitative determinations using whole cells. The most active cultures included species of Cellulomonas, Cellvibrio and Cytophaga. Cultures showing less activity than the above species included strains of Bacillus, Bacterium, Cytophaga, Pseudomonas. Cultures showing little or no activity included strains of Arthrobacter, Bacillus, and Cellvibrio. (Little-Battelle)
W73-08957

CESIUM-137 AND STABLE CESIUM IN A HYPEREUTROPHIC LAKE,
Michigan State Univ., East Lansing.
For primary bibliographic entry see Field 05C.
W73-08959

ACETYLENE REDUCTION IN SURFACE PEAT,
Dundee Univ. (Scotland). Dept. of Biological Sciences.
G. J. Waughman, and D. J. Bellamy.
Oikos, Vol 23, No 3, p 353-358, 1972. 3 fig, 2 tab, 19 ref.

Descriptors: *Peat, *Nitrogen fixation, *Assay, Ecosystems, *Path of pollutants, Gas chromatography, Mass spectrometry, Chemical reactions, Nitrogen, Chemical analysis, Enzymes, Mosses, Radioactivity techniques, Organic soils, Aquatic plants, Chlorophyta.
Identifiers: *Acetylene reduction, *Mire, Ethylene, N-15, Nitrogenase, Enzyme kinetics, Fate of pollutants, Nitrogen radioisotopes, Myricagale, Macrophytes, Nuphar lutea, Bryum pseudotriquetrum, Drepanocladus revolvens, Chara, Potamogeton polygonifolius, Carex spp, Scorpidium scorphiodes, Utricularia minor, Campylium stallatum, Riccardia pingius, Potentilla palustris, Molinia caerulea, Phragmites communis, Sphagnum spp, Aulaconnium palustre, Narthecium ossifragum, Calluna vulgaris, Rhynchospora alba, Drosera rotundifolia, Erica tetralix, Hylocomium splendens, Eriophorum spp.

An investigation was carried out between April and August 1971, using the acetylene reduction assay for nitrogen fixation. Ten samples were collected from three mire types and from blanket peat and flushed with a gas phase of O2, CO2 and Ar. Acetylene was injected into the sample chambers and the ethylene content was estimated at intervals by gas chromatography. Other time course experiments were carried out to determine the effect of glucose, carbon monoxide and a high ambient oxygen tension on acetylene reduction by the peat. Anaerobic nitrogenase activity and N-15 uptake were also measured using samples of one of the mire types. Nitrogen fixation in the mire system was confirmed by uptake of N-15. The rates were very low and near to the limits of detection by mass spectrometry. Nitrogenase activity measurements indicate that a relationship does exist between mire type and such activity, the highest rate being in rheophilus mire and the lowest in ombrophilous mire. (Holoman-Battelle)
W73-08960

DEOXYRIBONUCLEIC ACID IN ECOSYSTEMS,
North Carolina Univ., Chapel Hill.
For primary bibliographic entry see Field 05A.
W73-08961

EXCRETION MEASUREMENTS OF NEKTON AND THE REGENERATION OF NUTRIENTS NEAR PUNTA SAN JUAN IN THE PERU UPWELLING SYSTEM DERIVED FROM NEKTON AND ZOOPLANKTON EXCRETION,
Washington Univ., Seattle.
T. E. Whitledge.
Available from Univ. Microfilms, Inc., Ann Arbor, Mich. 48106 Order No. 73-3803. Ph D Dissertation, 1972. 126 p.

Descriptors: Water analysis, Fish, *Ammonia, *Nitrates, *Silicates, *Ureas, *Primary productivity, *Cycling nutrients, *Plankton, Bacteria, Sea water, Fluorescence, Phosphates, Zooplankton, Phytoplankton, Limiting factors, Diatoms, Food abundance, Upwelling, Oxygen demand, Automation.
Identifiers: *Creatine, *Excretion, Feces, Peruvian anchoveta, Northern anchovy, Tubesnout, Three-spined stickleback, Piceral, Rainbow wrasse, Stargazer, Detection limits, Biological samples, Orthophosphates, Sample preparation.

The excretion of nutrients and organic substances was examined for eight species of fish from several regions of the world's oceans. The excreted substances measured were ammonia, nitrate, orthophosphate, silicate, creatine, and urea. In addition soluble organic nitrogen excretion, oxygen utilization, and physical parameters were determined. Automated and manual methods for the determination of creatine in seawater were developed. The analysis consists of the addition of (1.2-cyclohexylenedinitrilo)tetraacetic acid, ninhydrin, and potassium hydroxide after which the fluorescence of the solution is measured. Concentrations of 0.05 to 30 microgram-at/creatine-N/liter were measured with the analysis. Regenerated production derived from the uptake of ammonia nitrogen was 28 percent of the nitrogen utilized by phytoplankton near Punta San Juan in Peru while new production derived from nitrate was used for the remaining 72 percent of the nitrogen. Of the ammonia nitrogen required for primary production 71 percent was estimated to be supplied by the excretion of anchoveta and 8 percent by zooplankton. The bacterial uptake of creatine was two times the quantity excreted by anchoveta. Phytoplankton uptake of urea was estimated to be three times the combined excretion of nekton and zooplankton. Excretion produces 37 and 4 percent respectively of the phosphorus and silica requirements of primary production in the Peru upwelling area. Silicate may limit the growth of diatoms. Anchoveta consume 72 to 80 percent of primary production. (Little-Battelle)
W73-08963

UTILIZATION OF CRUDE OIL HYDROCARBONS BY MIXED CULTURES OF MARINE BACTERIA,
Florida State Univ., Tallahassee.
H. I. Kator.
Available from Univ. Microfilms, Inc., Ann Arbor, Mich. 48106 Order No. 73-194. Ph D Dissertation, 1972. 257 p.

Descriptors: *Marine bacteria, *Microbial degradation, Sea water, Oily water, Degradation (Decomposition), Aromatic compounds, Organic compounds, Chemical analysis.
Identifiers: *Crude oil, *Substrate utilization, *Paraffins, *Fate of pollutants, Bacterial physiology, Column chromatography, Activated silica gel, Aliphatic hydrocarbons, Biosynthesis, Fatty acids, Aromatic hydrocarbons, Naphthalene, Anthracene, Alkyl benzenes, Pristane, Phytane, Culture media, Louisiana crude oil, Kuwait crude oil, Venezuelan crude oil, Enrichment.

Mixed populations of marine bacteria were isolated from a variety of marine and estuarine locations and maintained on a medium consisting of a sterile crude oil in a nutrient-salts enriched seawater (ESW). They degraded a variety of pure n-paraffins of chain lengths ranging from C-10 to C-30. While visible growth was not evident on selected examples of branched paraffins, aromatics, and heterocyclic compounds, a substrate transfer experiment revealed that some examples of alkyl benzenes, napthalene, and anthracene supported growth. A variety of crude oils of different composition (Louisiana, Kuwait, and Venezuelan crude oils) were degraded (in ESW) with consistent utilization of n-paraffins C-10 to C-30. Generally, the rates of utilization were inversely related to the chain lengths and directly related to the amount of each n-paraffin added to the growth flask. Sequential utilization of n-paraffins was followed by utilization of the branched paraffins pristane and phytane. Rates of utilization (20 C) for mixed cultures were 2 to 22 times larger in ESW than in unenriched seawater. Activated silica gel column chromatography of degraded crude oils revealed a preferential utilization of saturated paraffins in Kuwait, Venezuelan and Louisiana crude oils. Relative to the absolute weights of saturated paraffins utilized, aromatic-naphthenic utilization in whole crude oils was limited. Aromatic-naphthenic utilization in a crude oil from which normal paraffins were removed (using a molecular sieve) was small but significant. Intracellular fatty acids produced by bacterial cells grown on crude oils were similar to fatty acid profiles found in nonhydrocarbon grown bacterial cells. De novo fatty acid synthesis, rather than direct incorporation of the oxidized hydrocarbons as fatty acids, was therefore implied. (Holoman-Battelle)
W73-08967

ESTUARINE NITRIFICATION,
Rutgers - The State Univ., New Brunswick, N. J.
B. J. Berdahl.
Available from Univ. Microfilms, Inc., Ann Arbor, Mich. 48106, Order No. 73-4719. Ph D Dissertation, 1972. 334 p.

Descriptors: *Estuarine environment, *Ammonia, *Model studies, *Kinetics, *Estuaries, Salinity Nitrates, Nitrites, Equations, Chemical reactions, Oxidation, Mathematical studies, Dissolved oxygen, Water temperature, Hydrogen ion concentration, Conductivity, Saline water, Nitrogen.
Identifiers: *Nitrification, Fate of pollutants.

Nitrification, the oxidation of ammonia to nitrate by specific autotrophic bacteria, was studied in a model estuary system having a total flow (flushing) time of 30 days. During this time interval, the salinity was being increased exponentially until it reached that of coastal (100 percent) seawater. Ammonia-nitrogen was added to this salinity gradient at three points (day 0, day 10 and day 20 flow) corresponding to 2, 6, and 34 percent seawater. The concentrations ranged from 1 to 9 mg/l NH3-N. Daily measurements of ammonia, nitrite and nitrate-nitrogen along with conductivity (salinity), dissolved oxygen, temperature and pH were taken. Only two representative ammonia-nitrogen concentrations, 3 and 5 mg/l, were studied. Upon discharge at 2 and 6 percent seawater, NH3 was oxidized in two definite kinetic stages that were best described by an autocatalytic first-order equation (Stage 1) and a simple first-order equation (Stage 2). At 34 percent seawater, there was only sufficient time (10 days) for the first (autocatalytic) stage to develop. The 6 percent seawater starting salinity reduced (inhibited) the quantity of oxidized ammonia compared to 2 and 6 percent seawater. Low dissolved oxygen concentrations of 0.5-1/0 mg/l existed for at least 24 hours without any apparent effect upon nitrification. (Holoman-Battelle)
W73-08971

INVERTEBRATE DRIFT IN AN OHIO STREAM AND ITS UTILIZATION BY WARM-WATER FISHES,
Ohio State Univ., Columbus.
M. E. Sisk, Jr.
Available from Univ. Microfilms, Inc., Ann Arbor, Mich. 48106, Order No. 73-2128. Ph D Dissertation, 1972. 80 p.

Descriptors: Streams, *Food habits, *Fish, *Mayflies, *Diptera, Food abundance, Dominant organisms, Population, Invertebrates, Shiners, Sunfishes, Darters, Biomass, Sampling, Secondary productivity, Ohio.
Identifiers: *Drift organisms, Alum Creek, Baetis, Caenis.

The drift pattern of aquatic and terrestrial invertebrates in a Central Ohio stream (Alum Creek) supporting a warm-water fish fauna of shiners, darters and sunfishes was investigated. The study was intended to ascertain what fishes fed on drift and to what extent, whether or not the drift-food resource was shared by the fishes, whether or not the feeding activity of fishes was correlated with greatest drift activity, how abundant drift organisms were on a diel and seasonal basis, what portion of the drift was allochthonous in origin and what taxa were represented in the drift. Eleven 24-

hour collections were taken at a riffle site during the period of August, 1969 and July, 1970. Each monthly collection consisted of 10-minute drift net samples taken every two hours to determine quality and quantity of drift, four collections of fishes for stomach analysis and two bottom samples for determination of benthic biomass. Maximum drift of aquatic invertebrates in numbers and biomass occurred at 2300 hours. Baetidae was represented in the drift by five genera. The Chironomidae exhibited the most regular drift pattern and occurred in greatest numbers. Maximum drift in numbers and biomass of aquatic species occurred in May. Terrestrial adults contributed 74 percent in biomass and 24 percent by numbers to the annual drift and were collected mostly during daylight hours. The fishes fed heavily on both aquatic and terrestrial organisms but stomach contents of the fishes did not correlate with aquatic drift peaks. (Little/Battelle)
W73-08972

PROJECT WAGON WHEEL TECHNICAL STUDIES REPORT NO. 2.
El Paso Natural Gas Co., Tex.

Available from NTIS, Springfield, Va., as PNE-WW-13; $3.00 in paper copy, $1.45 microfiche. Report PNE-WW-13, Oct. 1972. L. A. Rogers, editor. 215 p, 75 fig, 72 tab, 118 ref.

Descriptors: *Radioactivity effects, *Radioecology, *Nuclear explosions, *Monitoring, Water wells, Well data, Texas, Baseline studies, Feasibility studies, Public health, Natural gas, Seismic properties, Seismic waves, Water pollution effects, Air pollution, Desert plants, Sagebrush, Semiarid climates, On-site investigations, Path of pollutants, Nuclear wastes, Biota, Radioisotopes, Absorption, Hazards.

Aspects of the proposed project (stimulation of natural gas by five 100-kiloton nuclear explosions) are evaluated in separate reports on effects of predicted ground motion, environmental radiation, off-site water-well and natural-spring documentation, temperature of the chimney, initial composition of the gas, release of radioactivity, stresses in the gas reservoir, and ecology of the environs. Environmental-radiation monitoring programs and equipment were tested and base-line data were obtained by measurements of samples of airborne particles, surface water, municipal and well water, precipitation, milk, soil, urine, vegetation, bottom sediment, fish, and animals. Sixty-two water wells and natural springs were identified within a 10-mile radius, 363 within a 20-mile radius and many were surveyed for later comparison with post-event data. Negligible environmental impact due to radioactivity from burning of the gas during well testing is shown. Base-line data on native vegetation were provided by inspection at 43 locations. Several varieties of sagebrush and grass are the principal vegetation in the immediate area. Environmental effects from farming, ranching, construction, and other activities were evident. (Bopp-ORNL)
W73-08991

CONCENTRATION FACTORS OF CHEMICAL ELEMENTS IN EDIBLE AQUATIC ORGANISMS,
California Univ., Livermore. Lawrence Livermore Lab.
S. E. Thompson, C. A. Burton, D. J. Quinn, and Y. C. Ng.
Available from NTIS, Springfield, Va., as UCRL-50564 Rev. 1; $3.00 paper copy, $1.45 microfiche. Report UCRL-50564 Rev. 1, Oct 1972. 73 p, 6 tab, 300 ref.

Descriptors: *Radioisotopes, *Absorption, *Food chains, *Reviews, *Bibliographies, Public health, Path of pollutants, Fallout, Nuclear wastes, Freshwater, Sea water, Estuarine environment, Marine animals, Marine plants, Marine fish, Marine algae, Freshwater fish, Aquatic plants, Aquatic animals, Aquatic environment, Radioecology, Trace elements, On-site data collections, Data collections.

In the compilation many of the estimated values of UCRL-50564 are replaced by measured values. As a result, certain values increased more than an order of magnitude (for uptake of Ta and Po by marine invertebrates; Th by marine fish; Ra and W by freshwater plants; Li, B, F, V, and Po by freshwater invertebrates; I, W, and Re by freshwater fish) and other values decreased more than an order of magnitude (Sb and U by marine plants; Zr, Sb, and U by marine invertebrates; Sc and Br by marine fish; Cl, Cr, and Br by freshwater plants; Cr, Zr, and Sb by freshwater invertebrates; Be, Co, Zr, Ag, Cd, and Sb by freshwater fish). For a discussion of the uses and limitation of concentration factors see W72-04484, W72-04491, W72-4490, and W73-00821. (Bopp-ORNL)
W73-08992

FINAL ENVIRONMENTAL STATEMENT RELATED TO OPERATION OF CALVERT CLIFFS NUCLEAR POWER PLANT UNITS 1 AND 2.
Directorate of Licensing (AEC), Washington, D.C.

Available from NTIS, Springfield, Va., as Docket 50317-87. $6.00 per copy, $1.45 microfiche. Dockets 50317-87 and 50318-84, April 1973. 309 p, 16 fig, 30 tab, 95 ref, 4 append.

Descriptors: *Nuclear powerplants, Effluents, Environment, Administrative agencies, *Comprehensive planning, *Sites, Geology, Investigations, Hydrology, Seismology, Climatology, Meteorology, Ecology, Radioactive wastes, Water pollution, Water pollution sources, Radioactive effects, Monitoring, Public health, Transportation, Beneficial use, Cost-benefit analysis, *Maryland, Chesapeake Bay, *Thermal pollution.
Identifiers: Atomic Energy Commission, *Pressurized water reactors, Lusby (Maryland), *Environmental impact statements.

This final environmental statement was prepared in compliance with the National Environmental Policy Act and relates to the continuation of construction and operation of the Calvert Cliffs nuclear power plants. Each of these units will employ a pressurized-water reactor cooled by salt water from and discharged to the Chesapeake Bay. The site is near Lusby, Maryland. Environmental impacts are assessed and after consideration of alternatives an environmental benefit-cost summary was compiled. Some environmental factors considered include climate, hydrology (surface water and ground water), ecology including aquatic life, cooling-water supply and discharge, cooling towers, cooling lakes, spray ponds, radioactive chemical and sanitary wastes, amount of dissolved oxygen and toxic chemicals in effluent water. The conclusion is to continue the construction permits and issue operating licenses for the facility subject to the following conditions: (1) establish a comprehensive biological monitoring program; (2) establish a hydrological monitoring program; (3) establish a radiological monitoring program to include sampling and analysis of milk and forage; (4) if harmful effects appear, a program of remedial action is to be taken immediately. (Houser-ORNL)
W73-08993

FINAL ENVIRONMENTAL STATEMENT FOR THE EDWIN I. HATCH NUCLEAR PLANT UNITS 1 AND 2.
Directorate of Licensing (AEC), Washington, D.C.

Available from NTIS, Springfield, Va., as Docket 50321-54; $3.00 as paper copy, $1.45. Docket 50321-54, Oct 1972. 194 p, 13 fig, 22 tab, 65 ref, 2 append.

Descriptors: *Nuclear powerplants, Effluents, Environment, Administrative agencies, *Comprehensive planning, *Site, Geology, Investigations, Hydrology, Seismology, Climatology, Meteorology, Ecology, Radioactive wastes, Water pollution, Water pollution sources, Radioactive effects, Monitoring, Public health, Transportation, Beneficial use, Cost-benefit analysis, Rivers, *Georgia, *Thermal pollution.
Identifiers: Atomic Energy Commission, *Boiling water reactors, *Altamaha River (Geo), *Environmental impact statements.

This final environmental statement was prepared in compliance with the National Environmental Policy Act and relates to the proposed issuance of operating license for Unit No. 1 and a construction permit for Unit No. 2 of the Edwin I. Hatch Nuclear Plant located at the Altamaha River, near Baxley, Georgia. The two boiling water reactors will be cooled by a closed-cycle cooling system using mechanical-draft cooling towers discharging waste to the atmosphere. Makeup water will be taken from the Altamaha River and blowdown returned to it. Environmental impacts are assessed and after consideration of alternatives an environmental benefit-cost summary was compiled. Some environmental factors considered include climate, hydrology (surface water and ground water), ecology including aquatic life, cooling-water supply and discharge, cooling towers, cooling lakes, spray ponds, radioactive chemical and sanitary wastes, amount of dissolved oxygen and toxic chemicals in effluent water. USAEC will issue an operating license for Unit 1 and a construction permit for Unit 2, subject to the following conditions: Applicant shall (1) establish preoperational base line data distribution of aquatic species, (2) minimize damage due to construction of transmission lines, (3) establish prior to operation a monitoring program for liquid effluents, (4) establish a program to monitor the ecosystems, (5) establish a radiological monitoring program, (6) provide a course of action to alleviate detrimental effects found, (7) provide analysis of alternates of venting gaseous effluents from the turbine building. (Houser-ORNL)
W73-08994

FINAL ENVIRONMENTAL STATEMENT RELATED TO OPERATION OF SHOREHAM NUCLEAR POWER STATION.
Directorate of Licensing (AEC), Washington, D.C.

Available from NTIS, Springfield, Va., as Docket 50322-30; $6.00 per copy, $1.45 microfiche. Docket 50322-30, September 1972. 585 p, 37 fig, 52 tab, 503 ref, 8 append.

Descriptors: *Nuclear powerplants, Effluents, Environment, Administrative agencies, *Comprehensive planning, *Sites, Geology, Investigations, Hydrology, Seismology, Climatology, Meteorology, Ecology, Radioactive wastes, Water pollution, Water pollution sources, Radioactive effects, Monitoring, Public health, Transportation, Beneficial use, Cost-benefit analysis, *New York, *Thermal pollution.
Identifiers: Atomic Energy Commission, *Boiling water reactors, *Brookhaven (N.Y.), *Environmental impact statements.

This final environmental statement was prepared in compliance with the National Environmental Policy Act and relates to the proposed construction of the Shoreham Nuclear Power Station, located at Brookhaven, New York. The Shoreham Station will consist of a boiling-water reactor with waste heat dissipated by once-through cooling seawater drawn from and discharged to Long Island Sound. Environmental impacts are assessed and after consideration of alternatives an environmental benefit-cost summary was compiled. Environmental factors considered include hydrology (surface water and ground water), ecology including aquatic life, cooling-water supply and discharge,

cooling towers, cooling lakes, spray ponds, radioactive chemical and sanitary wastes, amount of dissolved oxygen and toxic chemicals in effluent water. The conclusion is to issue a construction permit subject to the following conditions for protection of the environment: (1) protect Wading River marsh from blowing sand; (2) conduct additional biological studies to evaluate potential impact; (3) consider alternative intake systems and modifications to present design; (4) monitor accumulation and/or erosion of beach sand and gravel in vicinity of the intake jetties. (Houser-ORNL)
W73-08995

FINAL ENVIRONMENTAL STATEMENT RELATED TO OPERATION OF THREE MILE ISLAND NUCLEAR STATION UNITS 1 AND 2.
Directorate of Licensing (AEC), Washington, D.C.

Available from NTIS, Springfield, Va., as Docket 50289-80. $3.00 per copy, $1.45 microfiche. Dockets 50289-80 and 50320-38, Dec 1972. 251 p, 19 fig, 24 tab, 60 ref, 4 append.

Descriptors: *Nuclear powerplants, Effluents, Environment, Administrative agencies, *Comprehensive planning, *Sites, Geology, Investigations, Hydrology, Seismology, Climatology, Meteorology, Ecology, Radioactive wastes, Water pollution, Water pollution sources, Radioactive effects, Monitoring, Public health, Transportation, Beneficial use, Cost-benefit analysis, Rivers, *Pennsylvania, *Thermal pollution.
Identifiers: Atomic Energy Commission, *Pressurized water reactors, Susquehanna River, *Environmental impact statements, *Harrisburg (Penn).

This final environmental statement was prepared in compliance with the National Environmental Policy Act and relates to the proposed construction and operation of the Three Mile Island Nuclear Station Units 1 and 2. The station is comprised of two pressurized water reactor units having four natural draft cooling towers for dissipating waste heat from the closed cycle cooling water system and is located near Harrisburg, Pennsylvania. Cooling water will be discharged to the Susquehanna River. Environmental impacts are assessed and after consideration of alternatives an environmental benefit-cost summary was compiled. Some environmental factors considered include hydrology (surface water and ground water), ecology including aquatic life, cooling-water supply and discharge, cooling towers, cooling lakes, spray ponds, radioactive chemical and sanitary wastes, amount of dissolved oxygen and toxic chemicals in effluent water. The conclusion is to continue the construction permits and issue operating license for units 1 and 2 subject to certain specified monitoring programs for the protection of the environment. If harmful effects appear, the applicant is required to provide an analysis of expected impacts and a course of action to minimize these impacts. (Houser-ORNL)
W73-08996

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE LA SALLE COUNTY NUCLEAR STATION.
Directorate of Licensing (AEC), Washington, D.C.

Available from NTIS, Springfield, Va., as Docket 50373-32. $3.00 per copy, $1.45 microfiche. Dockets 50373-32 and 50374-31, Feb 1973. 267 p, 14 fig, 22 tab, 60 ref, 2 append.

Descriptors: *Nuclear powerplants, Effluents, Environment, Administrative agencies, *Comprehensive planning, *Sites, Geology, Investigations, Hydrology, Seismology, Climatology, Meteorology, Ecology, Radioactive wastes, Water pollution, Water pollution sources, Radioactive effects, Monitoring, Public health, Transportation, Beneficial use, Cost-benefit analysis, Lakes, *Illinois, *Thermal pollution.
Identifiers: Atomic Energy Commission, *Boiling water reactors, *Brookfield (Ill), *Environmental impact statements.

This final environmental statement was prepared in compliance with the National Environmental Policy Act and relates to a decision on the applications for construction permits for two reactors near Brookfield, Illinois. The two boiling water reactors are to be cooled by water obtained from and discharged to an artificial lake to be constructed. These facilities are part of the La Salle County Nuclear Station. Environmental impacts are assessed and after consideration of alternatives an environmental benefit-cost summary was compiled. Some environmental factors considered include climate, hydrology (surface water and ground water), ecology including aquatic life, cooling-water supply and discharge, cooling towers, cooling lakes, spray ponds, radioactive chemical and sanitary wastes, amount of dissolved oxygen and toxic chemicals in effluent water. The conclusion is to issue construction permits for the facilities subject to the following conditions: (1) applicant to submit a lake management program; (2) cleanup and resoration of transmission line construction; (3) locate intake to the blowdown system in the cooler part of the lake; and (4) implement a monitoring program to determine environmental effects of construction and operation. (Houser-ORNL)
W73-08997

DISTRIBUTION OF ICHTHYOPLANKTON IN THE WARM WATER DISCHARGE ZONE OF THE NOVOROSSIISK THERMAL ELECTRIC POWER PLANT, (IN RUSSIAN),
Rostov-on-Don State Univ. (USSR).
For primary bibliographic entry see Field 05C.
W73-09018

RARE CASE OF POISONING BY WATER POLLUTED WITH TOXIC AGRICULTURAL CHEMICALS, (IN RUSSIAN),
Khorezmskii Pedagogicheskii Institut, Urgench (USSR).
For primary bibliographic entry see Field 05C.
W73-09026

5C. Effects of Pollution

ESTUARINE POLLUTION, A BIBLIOGRAPHY.
Office of Water Resources Research, Washington, D.C.
For primary bibliographic entry see Field 02L.
W73-08451

BIOLOGICAL AND PHOTOBIOLOGICAL ACTION OF POLLUTANTS ON AQUATIC MICROORGANISMS,
Auburn Univ., Ala. Dept. of Chemistry.
W. C. Neely, R. C. Smith, R. M. Cody, J. R. McDuffie, and J. A. Lansden.
Available from the National Technical Information Service as PB-220 167, $5.45 paper copy, $1.45 microfiche. Alabama Water Resources Research Institute, Auburn Bulletin 9, February 1973. 122 p, 23 fig, 5 tab, 148 ref. OWRR A-017-ALA (2).

Descriptors: Pollutants, *Heavy metals, *Pesticide residues, Water pollution effects, Aquatic microorganisms, E. coli, Insecticides, Ions, *Pesticide toxicity, Photoactivation.
Identifiers: *Photosensitization, *Mutagens, Polycyclic amines, Metal ions, *Phototoxicity.

The various aspects of the biological and photobiological action of pollutants on aquatic microorganisms have been explored in a series of studies covering a wide range of chemical species and two classes of aquatic microorganisms, paramecia and bacteria. Certain metal ions, insecticides, polycyclic amines and mycotoxins are capable of drastic alteration of the life processes in test strains of either bacteria or paramecia or both. In some cases concurrent exposure to light and the pollutant was necessary and in others the toxic and/or mutagenic reactions were independent of light exposure. In particular the uranyl ion, beta naphthyl amine, and aflatoxin B1 were phototoxic while the insecticide, phygon, was strongly dark-toxic. All agents affected Paramecium caudatum and all but aflatoxin B1 affected Escherichia coli. In addition, the uranyl ion caused morphological mutations in E. coli. The public health hazard connected with such alterations in life-cycles resulting from water-borne pollutants is difficult to assess from laboratory data but the possibility should be further investigated.
W73-08452

AQUATIC FUNGI OF THE LOTIC ENVIRONMENT AND THEIR ROLE IN STREAM PURIFICATION,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Biology.
R. A. Paterson, and D. F. Farr.
Available from the National Technical Information Service as PB-220 012, $3.00 in paper copy, $1.45 in microfiche. Virginia Water Resources Research Center, Blacksbury, Completion Report, March 1973, 40 p, 18 fig, 10 ref. OWRR A-043-VA (1).

Descriptors: *Aquatic fungi, Running waters, Water pollution effects, *Water purification, *Toxicity, Zinc, Surfactants, *Virginia.
Identifiers: Pure culture studies, Mannitol, Cyanide, *Phycomycetes.

Samples were collected from three rivers and streams of varying physical and chemical characteristics. The samples were examined for aquatic Phycomycetes. These fungi were found in all samples collected. The filamentous forms such as Achlya, Saprolegnia, and Pythium were abundant in all three rivers. However, the unicellular forms such as Rhizophydium and Phlyctochytrium were infrequently encountered or absent in the eutrophic river but very common in the oligotrophic situations. Samples collected immediately below the introduction of the effluent from an Army ammunition plant showed a greatly reduced flora of aquatic Phycomycetes. Achlya flagellata, a Rhizidium sp. and a Phlyctochytrium sp. were isolated from natural collections and their responses in terms of growth and reproduction to zinc, mannitol, cyanide, and surfactants were observed. These studies showed the filamentous form, Achlya flagellata, to be more tolerant to the toxic effects of these chemicals than were the unicellular Phlyctochytrium and Rhizidium.
W73-08462

ADAPTATION TO EUTROPHIC CONDITIONS BY LAKE MICHIGAN ALGAE,
Wisconsin Univ., Milwaukee. Dept. of Botany.
K. C. Lin, and J. L. Blum.
Available from the National Technical Information Service as PB-220 013, $3.00 in paper copy, $1.45 in microfiche. Wisconsin Water Resources Center, Madison, Technical Report WIS-WRC 73-03, 1973. 24 p, 4 tab, 5 fig, 18 ref. OWRR A-041-WIS (1), 14-31-0001-3550.

Descriptors: *Aquatic algae, *Sessile algae, Nutrients, Tertiary treatment, *Phosphorus compounds, *Phosphates, Phosphorus, Plankton, Municipal wastes, *Lake Michigan, Eutrophication, *Wisconsin, Cladophora.
Identifiers: Milwaukee River, Milwaukee Harbor, *Ulothrix sp, *Cladophora glomerata.

Algae, when supplied with sufficient orthophosphate, can absorb phosphorus in quantities far in excess of the amount needed for optimal growth. This surplus phosphorus is then available for the algae to continue to grow when the external supply of orthophosphate is depleted. Studies were conducted on Cladophora glomerata and Ulothrix sp. to determine whether algae could utilize polyphosphate. Results showed that the extractable orthophosphate was inversely proportional to the ability of the algae species to hydrolyze either pyrophosphate or tripolyphosphate. Field investigations indicated that algae growing near the Milwaukee harbor area received a sufficient supply of orthophosphate, whereas the algae located some distance from the harbor did not. It is likely that the algae accumulated the soluble orthophosphate supplied by the waste water effluent and non-point sources discharged by the Milwaukee River. At the same time, the insoluble polyphosphate and organic phosphates dispersed into the open lake. The algae growing furthest from the harbor provided phosphatases to hydrolyze the polyphosphates, because of the lack of orthophosphate. This method of phosphorus assimilation by the algal metabolism produced less substantial growth. Field samples were collected in 1971 from four sample sites in the Milwaukee Harbor and five sites in Lake Michigan with a five kilometer radius of the harbor. (Kerrigan-Wisconsin)
W73-08463

BENTHAL OXYGEN DEMANDS AND LEACHING RATES OF TREATED SLUDGES,
Manhattan Coll., Bronx, N.Y.
J. A. Mueller, and W. J-l. Su.
Journal Water Pollution Control Federation, Vol 44, No 12, p 2303-2315, December 1972. 15 fig, 8 tab, 14 ref.

Descriptors: *Biochemical oxygen demand, *Cultures, *Leaching, *Sewage sludge, *Sludge disposal, Water pollution effects, *Chemical oxygen demand, Laboratory equipment, Heavy metals, Laboratory tests, Nutrients, Sludge treatment, Sea water, Phosphates, Nitrogen, Ammonia, Aluminum, Cadmium, Chromium, Copper, Iron, Lead, Magnesium, Manganese, Nickel, Zinc, Titanium, Benthos.
Identifiers: Arsenic.

The effects of sludge dumping in coastal waters, such as the New York Bight, were studied in the laboratory in continuous flow reactors supplied with raw, digested, heat treated, and wet oxidized sludges. The sludges were concentrated, analyzed, and seeded using sea water overlying sludge deposits. The reactors consisted of plexiglas cylinders 2 3/4 inch i.d. by 5 inches high mounted on a square base. A plastic screen covered the sludge to maintain stability during continuous air diffusion. The reactors were placed in a water bath maintained at 15 C. For each sludge, one reactor was used for determination of oxygen uptake and effluent analyses during a 45-day incubation period. A second reactor was used for sludge analysis after 21 days. After 45 days, sludge in a third reactor was mixed with its supernatant and oxygen uptake monitored for several days. Test results indicated that treatment of sludges before disposal reduced benthal demands and nutrient leaching rates. Benthal demands could be reduced 50 percent by heat treatment, low-pressure wet oxidation, or digestion, and over 90 percent by intermediate and high-pressure wet oxidation. Wet oxidation also provided the best reduction of volatile solids in the sludges. (Little-Battelle)
W73-08527

EFFECT OF PULPMILL EFFLUENT ON DISSOLVED OXYGEN IN A STRATIFIED ESTUARY -- I. EMPIRICAL OBSERVATIONS,
Fisheries Research Board of Canada, Nanaimo (British Columbia). Biological Station.
R. R. Parker, and J. Sibert.
Water Research, Vol 7, No 4, p 503-514, April 1973. 8 fig, 22 ref.

Descriptors: *Canada, *Dissolved oxygen, *Pulp wastes, Water pollution effects, *Stratification, *Estuaries, On-site investigations, On-aite tests, Laboratory tests, Chemical analysis, Water analysis, Industrial wastes, Water sampling, Salinity, Color, Light penetration, Saline water, Oxygen sag, Solar radiation, Primary productivity, Biomass, Nutrients.
Identifiers: *Alberni Inlet (Canada).

That pulpmill effluent discharged at the water's surface does suppress photosynthesis, thus oxygen production, in the stratum beneath the halocline by restricting light penetration has been examined empirically in the Alberni Inlet, Canada. Measurements were made of salinity, DO, primary productivity, color, light transmission, and solar radiation. The data indicate that the pulpmill effluent adversely affects DO levels in the estuary, and several possible causes are discussed. Net primary productivity was diminished by the light-absorbing stain. The situation cannot be remedied by removal of BOD from the effluent, rather the staining properties must be diminished or removed. (See also W73-08544) (Holoman-Battelle)
W73-08543

EFFECT OF PULPMILL EFFLUENT ON DISSOLVED OXYGEN IN A STRATIFIED ESTUARY - II. NUMERICAL MODEL,
Fisheries Research Board of Canada, Nanaimo (British Columbia). Biological Station.
J. Sibert, and R. R. Parker.
Water Research, Vol 7, No 4, p 515-523, April 1973. 3 fig, 2 tab, 16 ref.

Descriptors: *Canada, *Mathematical models, *Dissolved oxygen, *Estuaries, *Stratification, *Pulp wastes, Color, Light intensity, Nutrients, Inlets (Waterways), Inhibition, Photosynthesis, Respiration, Model studies, Biochemical oxygen demand, Industrial wastes, Primary productivity, Biomass, Bacteria, Algae, Growth rates, Saline water, Turbidity.
Identifiers: Pollutant removal, *Alberni Inlet (Canada), Substrate utilization.

A numerical model is presented which simulates the biological and physical processes of oxygen supply in a stratified inlet. The results of the model show that the introduction of pulpmill effluent into the upper layer of the inlet causes a decrease in the dissolved oxygen concentration of the water due to blockage of photosynthesis in the stratum of water immediately below the halocline. Removal of the biochemical oxygen demand from the effluent has very little effect on the oxygen concentration in the upper layer since the supply of oxygen from the lower layer is blocked by the stain. Removal of 90 percent of the stain from the effluent restores the oxygen concentrations to near normal. (See also W73-08543) (Holoman-Battelle)
W73-08544

A MALLOMONAS BLOOM IN A BULGARIAN MOUNTAIN LAKE,
Copenhagen Univ. (Denmark). Inst. of Plant Anatomy and Cytology.
For primary bibliographic entry see Field 05A.
W73-08545

EFFECTS OF BUNKER C OIL ON INTERTIDAL AND LAGOONAL BIOTA IN CHEDABUCTO BAY, NOVA SCOTIA,
New Brunswick Univ., St. John. Dept. of Biology.
M. L. H. Thomas.
Journal of the Fisheries Research Board of Canada, Vol 30, No 1, p 83-90, January 1973. 30 ref.

Descriptors: Water pollution effects, *Oil pollution, *Oil spills, Intertidal areas, *Lagoons, *Biota, Marine plants, Marine animals, Mortality, Water pollution sources, Marine algae, Kelp, Phaeophyta, Clams, Invertebrates, Mussels, Crustaceans, Mollusks, Fishkill, Marine fish, Sculpins, Gastropods, Snails, *Canada.
Identifiers: *Bunker C oil, Isle Madame, *Chedabucto Bay (Nova Scotia), Mya arenaria, Spartina alterniflora, Fucus spiralis, Barnacles, Arthropods, Macroinvertebrates, Ulvaria subbifurcata, Myoxocephalus scorpius, Liparis atlanticus, Pholis gunnellus, Rock eel, Ulva fish, Balanus balanoides, Littorina saxatilis, Littorina littorea, Littorina obtusata, Zostera marina, Eel grass, Cord grass, Macrophytes.

In February 1970, a large spill of Bunker C oil occurred in Chedabucto Bay, Nova Scotia. Observations were made on the effects of the oil on the intertidal and lagoonal biota from seven sites in the Isle Madame area where oiling was heavy and repeated. Transects delineated the observational area at each station. Initial effects of oil involved minor smothering of fauna and tearing loose of algae. Longer term effects involved extensive mortalities of Fucus spiralis on rocky shores and Mya arenaria and Spartina alterniflora in lagoons. Other biota were not visually affected. In all three affected species, mortalities took place either continuously or only in the second year of pollution. Causes of death are unknown. It is recommended that in all intertidal areas very heavy oil deposits should be mechanically removed and the remainder of the oil left to natural degradation. (Holoman-Battelle)
W73-08548

ENDRIN TOXICOSIS IN RAINBOW TROUT (SALMO GAIRDNERI),
Bureau of Sport Fisheries and Wildlife, Columbia, Mo. Fish-Pesticide Research Lab.
B. F. Grant, and P. M. Mehrle.
Journal of the Fisheries Research Board of Canada, Vol 30, No 1, p 31-40, January 1973. 2 fig, 4 tab, 26 ref.

Descriptors: *Rainbow trout, *Endrin, *Pesticide toxicity, *Fish physiology, *Bioassay, Water pollution effects, Insecticides, Chlorinated hydrocarbon pesticides, Lethal limit, Survival, Laboratory tests, Electrolytes, Animal growth, Proteins.
Identifiers: *Salmo gairdneri, Biochemical tests, Serum, Cholesterol, Cortisol, Lactate, Glucose, Glycogen, Liver, Fat tissue.

In mature rainbow trout (Salmo gairdneri) receiving sublethal doses of endrin (4.3-145 micrograms/kg body wt/day in 0.215-7.25 mg/kg of food) for 163 days and then forced to swim for 1 hr, the insecticide affected serum electrolytes, osmolality, total protein, cholesterol, cortisol, lactate, glucose, liver glycogen, and growth. Forced swimming alone altered 9 of 16 serum parameters examined. Apparent increases in serum Na and Cl and significant increases in osmolality and liver glycogen were directly related to dosage. A biphasic distribution of phosphate, total protein, and cholesterol with dosage was apparent. Glucose was increased about 50 percent by 145 micrograms/kg but was unaffected by lower doses. Variance analysis of zone electrophoretic patterns disclosed an interaction between serum protein distribution and dose. Mobilization of liver glycogen was apparently inhibited by low doses and almost totally blocked by high doses. Correspondingly, trout given 14.5 micrograms/kg or more had lowered serum cortisol levels whereas the lowest dose elevated cortisol. Growth was inhibited appreciably by 145 micrograms/kg but not by lower doses. Visceral fat accumulated 4.8-8.7 micrograms endrin/g tissue in the 43 and 145 micrograms/kg exposures. It is concluded that endrin caused dysfunction of physiologic processes critical to survival. (Holoman-Battelle)
W73-08549

THE PERCENT UN-IONIZED AMMONIA IN AQUEOUS AMMONIA SOLUTIONS AT DIFFERENT PH LEVELS AND TEMPERATURES,
British Columbia Dept. of Recreation and Conservation, Victoria. Fish and Wildlife Branch.
For primary bibliographic entry see Field 05A.
W73-08550

A METHOD FOR THE IN SITU STUDY OF ZOOPLANKTON GRAZING EFFECTS ON ALGAL SPECIES COMPOSITION AND STANDING CROP,
Yale Univ., New Haven, Conn. Dept. of Biology.
For primary bibliographic entry see Field 05A.
W73-08559

MERCURY IN A MARINE PELAGIC FOOD CHAIN,
Stanford Univ., Pacific Grove, Calif. Hopkins Marine Station.
For primary bibliographic entry see Field 05B.
W73-08562

A TECHINQUE FOR THE ESTIMATION OF INDICES OF REFRACTION OF MARINE PHYTOPLANKTERS,
Oregon State Univ., Corvallis. School of Oceanography.
For primary bibliographic entry see Field 05A.
W73-08564

DEVELOPMENT OF SIMULIUM (PSILOZIA) VITTATUM ZETT (DIPTERA: SIMULIIDAE) FROM LARVAE TO ADULTS AT INCREMENTS FROM 17.0 TO 27.0 C,
Batelle-Pacific Northwest Labs., Richland Wash.
C. D. Becker.
The American Midland Naturalist, Vol 89, No 1, p 246-251, January 1973. 3 fig, 1 tab, 9 ref.

Descriptors: *Bioassay, *Thermal pollution, Life cyclexx, *Columbia River, *Nuclear reactors, *Growth rates, Water pollution effects, Period of growth, Water temperature, Larvae.
Identifiers: *Blackflies, Simulium (Psilozia) vittatum, Diptera.

Blackfly larvae were exposed to 2.5C thermal increments ranging from 17.0-27.0C to determine whether increased temperatures might increase the organism's rate of development. Larvae were grown in 1000-ml filtration flasks connected by syphon to a source providing a controlled mix of heated and unheated water from the Columbia River. The tests show that the thermal increments proportionally increase the rate of development through the pupal to the adult stage. A 10 C rise in temperature reduces the subsequent mean development span by about half, from 8 days at 17 C to 4 days at 27C. Temperatures of 27C appear to be within the upper thermal tolerance of the species. It is concluded that thermal increments from reactor discharges in the Columbia River have probably exerted some effect on the development of blackflies, particularly by advancing the emergence of the first spring generation. (Little-Battelle)
W73-08577

THE EFFECTS OF ARTIFICIAL AERATION ON THE DEPTH DISTRIBUTION OF THE CRAYFISH ORCONECTES VIRILIS (HAGEN) IN TWO MICHIGAN LAKES,
Michigan State Univ., East Lansing. Dept. of Fisheries and Wildlife.
A. W. Fast, and W. T. Momot.
The American Midland Naturalist, Vol 89, No 1, p 89-102, January, 1973. 7 fig, 27 ref.

Descriptors: *Spatial distribution, *Michigan, *Aeration, *Environment effects, *Crayfish, Oxygen requirements, Animal behavior, Water levels, Depth, On-site investigations, On-site data collections, Animal physiology, Crustaceans, Invertebrates, Dissolved oxygen, Lake morphometry, Eutrophication, Sampling.
Identifiers: Orconectes virilis, *Hemlock Lake (Michigan), *Section Four Lake (Michigan), Macroinvertebrates, Arthropods, Decapods.

Crayfish (Orconectes virilis) usually exhibit seasonal depth distributions in certainnorthern Michigan lakes based on sex, age and water temperature. After releasing attached young in shallow water, the adult females typically migrate to deeper cold water while the adult males remain in the warm shallow water. This pattern was thought to be related to the sexual maturation cycle. However, when two lakes were artificially aerated and destratified with compressed air, both sexes distributed throughout the lakes. It is, therefore, postulated that under normal conditions of thermal stratification, the social aggression of the larger males forces the females into deeper, colder water and that this aggression is temperature-related. If oxygen or some other factor is not limiting, 10 C seems to be the lowest temperature selected by O. virilis during the summer. (Holoman-Battelle)
W73-08583

CHANGES IN CHLOROPLAST STRUCTURE DURING CULTURE GROWTH OF PERIDINIUM CINCTUM FA. WESTII (DINOPHYCEAE),
Tel-Aviv Univ., (Israel). Lab. for Electron Microscopy.
G. Messer, and Y. Ben-Shaul.
Phycologia, Vol 11 Nos 3/4, p 291-299, December 1972. 2 fig, 1 tab, 18 ref.

Descriptors: *Aging (Biological), *Dinoflagellates, *Cytological studies, Electron microscopy, Pyrrophyta, Cultures, Protoza, Plant growth, Animal growth, Plant pigments, Spectrophotometry, Statistical methods.
Identifiers: *Peridium cinctum westii, *Unialgal cultures, Chlorophyll a, Chlorophyll c, Chloroplasts, Ultrastructure, Thylakoids, Flagellates, Culture media.

Observations are presented which indicate that chlorophyll content and chloroplast ultrastructure may serve as parameters of aging during the growth of Peridinium cinctum westii in laboratory culture. Unialgal cultures were grown in liquid medium Carefoot medium: Lake Tiberias water, 1:4 at pH 7.5 under constant illumination of 1800 lux at 19C. Samples were taken for determinations of cell number, mean cell volume, and chlorophyll, and for examination by electron microscopy. These analyses were performed at intervals during 75 days of culture maintenance. Cell size and chlorophyll content increased during early growth and decreased with culture aging. Chloroplasts contained fewer thylakoids, were narrower, and showed greater association with endoplasmic reticulum and cytoplasmic ribosomes in cells at stationary phases than in those during exponential phase. Chloroplast divisions at early growth phases showed that bands comprising three thylakoids are continuous between daughter chloroplasts and may be synthesized prior to division. (Holoman-Battelle)
W73-08584

PHOTOSYNTHESIS AND RESPIRATION OF SOME ARCTIC SEAWEEDS,
Scripps Institution of Oceanography, La Jolla, Calif.
F. P. Healey.
Phycologia, Vol 11, Nos 3/4, p 267-271, December, 1972. 1 fig, 2 tab, 15 ref.

Descriptors: *Photosynthesis, *Respiration, *Plant physiology, *Marine algae, On-site tests, Laboratory tests, Phaeophyta, Kelp, Chlorophyta, Light intensity, Plant growth, Water temperature, *Alaska, Arctic, Rhodophyta.
Identifiers: Chaetomorpha, Halosaccion glandiforme, Fucus, Laminaria complanata, Corallina officinalis var. chilensis, Heterochordaria abietina, Rhodomela larix, Ahnfeltia spp, Gigartina, *Arctic seaweeds.

Both laboratory and in situ measurements of photosynthesis and respiration were made of some Artic seaweeds in order to determine: (1) the ability of the algae to show positive net photosynthesis under natural or simulated conditions, and (2) growth of the specimens suspended beneath ice as well as adaptations to low temperatures. Conventional manometric techniques were used for laboratory measurements and clear and darkened BOD bottles were used in situ measurements. The temperature optima of these reactions were similar to those of temperate seaweeds and much higher than the local temperatures. However, reaction rates at low temperatures (as a percentage of the maximum rate) were higher than those reported for plants grown or collected at higher temperaturesLaboratory and in situ measurements resulted in similar estimates of compensating intensities. They also showed that little or no growth could be expected beneath snow-covered ice, but growth could occur beneath about 70 cm of ice cleared of snow. (Holoman-Battelle)
W73-08585

A FURTHER CONTRIBUTION TO THE DIATOM FLORA OF SEWAGE ENRICHED WATERS IN SOUTHERN AFRICA,
National Inst. for Water Research, Pretoria (South Africa).
F. R. Schoeman.
Phycologia, Vol 11, Nos 3/4, p 239-245, December, 1972. 10 fig, 2 tab, 36 ref.

Descriptors: *Diatoms, *Eutrophication, Water pollution, *Systematics, *Sewage, Ecology, Aquatic algae, Chrysophyta, Water analysis, Chemical analysis, Physical properties, Chemical properties, Biochemical oxygen demand, Chemical oxygen demand, Ammonia, Nitrogen, Nitrates, Hydrogen ion concentration, Dissolved solids, Alkalinity, Sampling, Hardness (Water), Sodium, Chlorides, Sulfates, Bioindicators.
Identifiers: *Walvis Bay, *South Africa, Organic nitrogen, Amphora subacutiuscula, Amphora tenerrima, Anomoeoneis sphaerophora, Cyclotella meneghiniana, Cymbella pusilla, Fragilaria pinnata, Navicula pseudohalophila, Nitzschia apiculata, Nitzchia fonticola, Nitzschia thermalis, Synedra tabulata.

The systematics and autecology of the diatoms observed in an algal sample from a maturation pond of the Walvis Bay (South West African coast) sewage works are discussed. Fourteen diatom species are recorded. A new species, Amphora subacutiuscula, is described. The diatom association was subjected to a statistical analysis to determine the relative abundance of the different species in the association. Since the structure of the diatom association is the result of environmental conditions, it is possible to employ the association to determine the ecological conditions prevailing in the water. The chemical results of the maturation pond water suggest eutrophic, alkaline water with a high concentration of dissolved solids. Therefore, species favoring these conditions are expected to occur in this water. Except for the new species, Amphora subacutiuscula, whoe autecology is still unknown, all the other species recorded in this sample are alkaline water inhabitants. Many of these are brackish species or are able to tolerate certain fluctuations in osmotic pressure. The dominant species, Amphora tenerrima, suggests brackish conditions. Cyclotella meneghiniana, a sub-dominant species, is known to be nitrogen heterotrophic and, therefore, grew well in the pond. (Holoman-Battelle)
W73-08586

DIATOM COMMUNITY RESPONSE TO PRIMARY WASTEWATER EFFLUENT,
Montana State Univ., Bozeman. Dept. of Botany and Microbiology.
L. L. Bahls.
Journal Water Pollution Control Federation, Vol 45, No 1, p 134-144, January, 1973. 2 fig, 7 tab, 27 ref.

Descriptors: Water pollution effects, *Biological communities, *Diatoms, Sewage treatment, *Waste water (Pollution), Water analysis, Chemical analysis, Nutrients, Bioindicators, Nitrogen, *Montana, Plant populations, Water sampling, Alkalinity, Sulfates, Fluorides, Chlorides, Nitrites, Nitrates, Ammonia, Silica, Turbidity, Specific conductivity, Hydrogen ion concentration, Chrysophyta, Aquatic algae, Water pollution, Sewage effects, Outlets, Physical properties, Chemical properties.
Identifiers: *East Gallatin River (Wyo), Species diversity, Nitzschia dissipata, Atomic absorption spectrophotometry, Nitzschia epiphytica, Navicula cryptocephala var. veneta, Achnanthes minutissima, Navicula pelliculosa, Navicula tripunctata, Navicula minuscula, Gomphonema olivaceum, Nitzschia palea, Navicula minima, Cymbella ventricosa, Navicula viridula, Surirella ovata, Amphora ovalis var. pediculus, Nitzschia communis, Diatoma vulgare, Navicula cryptocephala, Cocconeis placentula var. euglypta, Nitzschia romana.

A study was made of the diatom community in the East Gallatin River above and below the Bozeman, Montana, wastewater treatment plant. Water samples for chemical and physical analyses and diatom collections from natural substrates were made monthly. The water quality parameters measured were water temperature, pH, Ca, Mg, alkalinity, sulfate, orthophosphate, fluoride, chloride, nitrite, nitrate, ammonia, silica, turbidity, specific conductivity, Na, and K. The diatom taxa identified were correlated with the nutrients that were present in the forms of phosphate, NH3-N, and nitrate-nitrogen. Of the 12 major taxa identified, Nitzschia dissipata was the most frequently occurring diatom. Just below the wastewater outfall a nitrogen heterotroph, Nitzschia epiphytica, was most abundant. Together these two taxa accounted for 50 percent of the mean abundance of all the taxa in the river. Calculations were made to determine simple and multiple correlation coefficients between diatom diversity and individual taxa and the various nutrients. Overall, diversity correlated negatively with ammonia and positively with phosphate. (Holoman-Battelle)
W73-08588

WHAT'S KNOWN ABOUT PENTACHLOROPHENOLS,
Environmental Protection Service. Halifax (Nova Scotia).
For primary bibliographic entry see Field 05B.
W73-08599

THE EFFECTS OF WASTE DISCHARGES FROM RADFORD ARMY AMMUNITION PLANT ON THE BIOTA OF THE NEW RIVER, VIRGINIA,
Virginia Polytechnic Inst. and State Univ., Balcksburg. Dept. of Biology.
J. Cairns, and K. L. Dickson.
Available from the National Technical Information Service as PB-219 982, $3.00 in paper copy, $1.45 in microfiche. Virginia Water Resources Research Center, Blacksburg, Bulletin 57, April 1973. 58 p, 13 tab, 5 fig, 9 ref. OWRR B-017-VA (10).

Descriptors: Water pollution effects, *Fish, Minnows, Perches, Sucker, Sunfishes, Catfishes, *Biota, Baseline studies, *Waste assimilative capacity, *Virginia, Chemical wastes, Liquid wastes, Industrial wastes, Effluents, Organic wastes, Thermal pollution, Acids, *Benthic fauna, Aquatic plants, Aquatic animals, *Invertebrates, Nitrogen compounds, *Algae, Diatoms.
Identifiers: Stream survey, Biological survey, *Munition wastes, TNT wastes, Nutrient enrichment, *New River (Va), Ash wastes, Waste discharge, *Pollution recovery (River), Bacillariophyta.

The effects of waste discharges from Radford Army Ammunition Plant (RAAP), Radford, Virginia, on fish, bottom fauna, algae, and higher aquatic plants in the New River were investigated in June 1971. Sampling stations were established upstream and downstream from the RAAP discharges. These stations were located to evaluate the individual effects of the various discharges (acid wastes, organic solvent wastes, thermal effluents, nitrogenous TNT wastes, and ash) on the fauna and flora. This was possible because there were a number of waste streams discharged at various points along the New River rather than a single combined waste discharge. An independent analysis of the data for each taxonomic group is presented along with general conclusions which integrate the findings of all the investigators. The waste discharges from the plant caused localized damage to the fauna and flora of the New River; however, the river had recovered in the five miles contained within the boundaries of the plant property.
W73-08606

THE EFFECTS OF TEMPERATURE AND IONS ON THE CURRENT-VOLTAGE RELATION AND ELECTRICAL CHARACTERISTICS OF A MOLLUSCAN NEURONE,
Massachusetts Eye and Ear Infirmary, Boston. Dept. of Ophthalmology.
M. F. Marmor.
Journal of Physiology, Vol 218, No 3, p 573-598, 1971. 12 fig, 52 ref.

Descriptors: *Semipermeable membranes, *Temperature, *Ion transfer, *Mollusks, *Electrical properties, Biochemistry, Physiology, Cytological studies, Metabolism, Structure, Chemical analysis, Chemical reactions, Water pollution effects.

This study continues experiments performed on the gastro-oesophageal giant neurone (G cell) of the marine mollusc Anisodoris nobilis MacFarland. It demonstrates, first, that inward-going rectification in the G cell depends upon the temperature and the external K ion concentrations. Secondly, temperature and Ca ions influence a high conductance state which develops when the cell is strongly hyperpolarized. Thirdly, temperature, membrane potential, and external ions affect the time and resistance constants of the membrane. Finally observations that the conductance of the G cell soma is dominated by the axon are confirmed under conditions where inward-going rectification does not complicate the analysis. (Jerome-Vanderbilt)
W73-08621

THE ATMOSPHERIC EFFECTS OF THERMAL DISCHARGES INTO A LARGE LAKE,
Argonne National Lab., Ill.
J. E. Carson.
Journal of the Air Pollution Control Association, Vol 22, No 7, p 523-528, July 1972. 32 ref, 1 append.

Descriptors: *Nuclear powerplants, *Heated water, *Environmental effects, *Meteorology, *Fog, Electric power production, Thermal powerplants, Discharge (Water), Atmosphere, Lakes, *Lake Michigan, Precipitation, Evaluation.

Potential meteorological effects of waste heat from nuclear power plants with once-through cooling systems are discussed with the primary emphasis upon the atmospheric changes over a large lake like Lake Michigan. The amount of heat energy in the cooling water is quite small compared to the natural heat processes and since it will be dissipated over a large area the changes in weather will be small and probably impossible to isolate in the natural variability of weather elements. An exception is the increase in steam fog at the point of discharge during fall and winter. Alternate cooling systems, such as cooling towers, cooling ponds and spray canals release their energy rapidly over a small area, therefore, the potential for local weather changes is increased. From a meteorologist's view, once-through cooling is preferred over other methods. Assumptions and calculations for setting up a meteorological model are presented. (Jerome-Vanderbilt)
W73-08623

THE EFFECT OF TEMPERATURE ACCLIMATION UPON SUCCINIC DEHYDROGENASE ACTIVITY FROM THE EPAXIAL MUSCLE OF THE COMMON GOLDFISH (CARASSIUS AURATUS L.)-I. PROPERTIES OF THE ENZYME AND THE EFFECT OF LIPID EXTRACTION,
Nebraska Univ., Lincoln. Dept. of Zoology.
J. R. Hazel.
Comparative Biochemistry and Physiology, Vol 43B, No 4B, p 837-861, 1972. 10 fig, 3 tab, 66 ref.

Descriptors: *Adaptation, Fish, *Enzymes, *Catalysts, *Lipids, Biochemistry, *Water temperature, Chemical reactions, Physiology, Environmental effects, Metabolism, Kinetics, Inhibitors, Measurement, Laboratory tests, Water pollution effects.
Identifiers: *Succinic dehydrogenease, *Goldfish.

The objectives were twofold: to examine the properties of a single enzyme system which contributes to the maintenance of a temperature independent rate of catalysis over three distinct time course periods; and to determine whether or not the temperature induced changes in lipid composition which occur during temperature acclimation may be responsible for changes in respiratory enzyme activity. Evidence strongly suggests that goldfish SHD is non-isozymal and is present in the same molecular form at all temperatures. It is also suggested that temperature-induced change in membrane composition may influence the catalytic activity of membrane-bound enzymes. The SDH system exhibits compensation of catalytic function by virtue of an increased specific activity following a period of cold acclimation, by an E (a) function which correlates with environmental temperature during evolutionary adaptation, and by several inherent properties of the enzymatic protein which result in temperature independent catalysis over the short term (immediate compensation). (See also W73-08626) (Jerome-Vanderbilt)
W73-08625

THE EFFECT OF TEMPERATURE ACCLIMATION UPON SUCCINIC DEHYDROGENASE ACTIVITY FROM THE EPAXIAL MUSCLE OF THE COMMON GOLDFISH (CARASSIUS AURATUS L.)-II. LIPID REACTIVATION OF THE SOLUBLE ENZYME,
Nebraska Univ., Lincoln. Dept. of Zoology.
J. R. Hazel.
Comparative Biochemistry and Physiology, Vol 43B, No 4B, p 863-882, 1972. 8 fig, 3 tab, 46 ref.

Descriptors: Fish, *Metabolism, *Water temperature, *Biological membranes, *Enzymes, *Lipids, Biochemistry, Animal physiology, Adaptation, Respiration, Environmental effects, Morphology, Kinetics, Laboratory tests, Chemical analysis, Water pollution effects.
Identifiers: *Goldfish.

The properties of lipids extracted from the mitochondria of goldfish acclimated to 5C and 25C are compared in terms of their ability to reactivate the soluble (lipid-free) succinic dehydrogenase

from both acclimated groups. The materials and methods of investigation in these experiments are described and results are presented and discussed. The specific activity of soluble succinic dehydrogenase was increased by incubation with soluble lipid preparations. A total mitochondrial lipid extract from 5C - acclimated goldfish was a more effective reactivator of the enzyme than a comparable extract from 25C - acclimated goldfish; this difference was referable to the greater degree of unsaturation of the 5C lipid. It was indicated that the affinity of the enzyme for lipid was largely dependent upon the phosphatide species, whereas the magnitude of the reactivation was dependent primarily upon the degree of unsaturation of the fatty acid residues. The results may be interpreted as indicating that the increased specific activity of succinic dehydrogenase following a period of cold acclimation can largely be explained by underlying changes in the membrane composition rather than the quantity of the enzyme. (See also W73-08625) (Jerome-Vanderbilt)
W73-08626

TEMPERATURE DEPENDENCE OF THE ATP--ASE ACTIVITES IN BRAIN HOMOGENATES FROM A COLD-WATER FISH AND A WARM--WATER FISH,
Turku Univ. (Finland). Zoophysiological Lab.
J. Kohonen, R. Tirri, and K. Y. H. Lagerspetz.
Comparative Biochemistry and Physiology, Vol 44B, No 3B, p 819-821, 1973. 1 fig, 5 ref.

Descriptors: Biochemistry, Fish, *Chemical reactions, *Water temperature, Animal physiology, Metabolism, Enzymes, Chemical properties, Bioassay, Laboratory studies, Water pollution effects.
Identifiers: *ATPase, *Roach, *Gouramis.

A species of cold water fish (Leuciscus rutilus) and a species of warm water fish (Helostoma temmincki) were chosen as test animals for this study which investigated the brain adenosinetriphosphatases as they relate to the different temperature requirements of the two species. The gouramis were kept at 28C while the roach were maintained at 5C. The fish were decapitated and the brains were excised and homogenized. Assays of the Mg (++) and the Na (+)-K (+) ATPase activities in the homogenates were performed. The Mg (++) ATPase activity in the brain homogenates from the cold water fish was less sensitive to temperature and showed maximum activity and a discontinuity point at temperatures 5C lower than the Mg (++) ATPase from warm water fish. The brain Na (+)-K (+) ATPase activity in the roach showed a curvilinear temperature dependence with activity maxima at 41C and 20C, while the gourami had one maximum at 45C and was relatively insensitive to temperature between 35C and 20C. It is suggested that there are present at least two Na (+)-K (+) isozymes with different temperature characteristics. (Jerome-Vanderbilt)
W73-08627

EFFECT OF TEMPERATURE ON MEMBRANE POTENTIAL AND IONIC FLUXES IN INTACT AND DIALYSED BARNACLE MUSCLE FIBRES,
Instituto Venezolano de Investigaciones Cientificas, Caracas.
R. Dipolo, and R. Latorre.
Journal of Physiology, Vol 225, No 2, p 255-273, 1972. 2 tab, 8 fig, 23 ref.

Descriptors: *Aquatic animals, *Water temperature, *Ion transport, *Membranes, Physiology, Biochemistry, Environmental effects, Metabolism, Inhibitors, Radioisotopes, Chemical reactions, Dialysis, Water pollution effects, *Crustaceans.
Identifiers: *Barnacles.

The temperature-dependent component of resting potential is insensitive to inhibitors of the sodium pump. The large size of barnacle muscle fiber permits measurements of ionic fluxes with radioactive isotopes by means of a dialysis technique at different temperatures in the same muscle fiber. The experiments indicate that the phenomenon under study is probably related to a variation in the passive permeability rather than to active transport. The maintenace of specimens and dissection of single fibers, dialysis procedure, membrane potential measurements, flux determinations, solutions, and calculation methods are discussed. Addition of strophanthidin, removal of the external potassium, and replacement of the external sodium by lithium all strongly reduced the sodium efflux in barnacle muscle fibers, but none of these conditions affects the variation of resting potential with temperature. In contrast, the removal of the external chloride in barnacle muscle cells produces a substantial decrease in the voltage shift induced by temperature. The effect of changes in external chloride concentration on the temperature-dependent component of the resting potential remains unclear and needs further study. (Jerome-Vanderbilt)
W73-08628

EFFECTS OF THERMAL ACCLIMATION ON PHYSIOLOGICAL RESPONSES TO HANDLING STRESS, CORTISOL AND ALDOSTERONE INJECTIONS IN THE GOLDFISH, CARASSIUS AURATUS,
Cincinnati Univ., Ohio. Dept. of Biological Sciences.
B. L. Umminger, and D. H. Gist.
Comparative Biochemistry and Physiology, Vol 44A, p 967-977, 1973. 3 fig, 1 tab, 52 ref.

Descriptors: Fish, Water temperature, *Metabolism, *Stress, Biochemistry, Physiology, Adaptation, Environmental effects, Chemical reactions, Laboratory tests, Measurements, Evaluation, Water pollution effects.
Identifiers: *Cortisol, *Aldosterone, *Goldfish.

As part of a study to evaluate the actions of steroid hormones, cortisol and aldosterone, on carbohydrates and electrolyte regulation in goldfish acclimated to several different temperatures, this investigations was performed to assess the stressful effects of the injection procedure. Eighty-four goldfish were divided into groups of 28 which were held at 20 C, 32C and 10C. Fish at each temperature were injected with cortisol or subjected to sham injection procedures and analysed along with fish from control groups maintained at the same temperature. The fish subjected to stress and sham injection responded with a hyperglycemia and a decline in serum chloride and sodium concentrations. The stressful effects were most pronounced in fish acclimated to 10 C and least apparent in fish acclimated to 32 C. Injections of cortisol further lowered serum electrolyte levels in warm acclimated fish and increased the serum glucose level of fish acclimated to 20 C. (Jerome-Vanderbilt)
W73-08632

PHYTOPLANKTON AS A BIOLOGICAL INDICATOR OF WATER QUALITY,
Universidad Central de Venezuela, Caracas. Dept. of Sanitary Engineering.
I. Villegas, and G. de Giner.
Water Research, Vol 7, No 3, p 479-487, 1973. 4 fig, 3 tab, 9 ref.

Descriptors: *Phytoplankton, *Bioindicators, *Water quality, Biological communities, Diatoms, Chlorophyta, Cyanophyta, Scenedesmus, Rivers, Ecological distribution, Water pollution effects, Systematics.
Identifiers: *San Pedro River (Venezuela), Species diversity, Ulothrix.

The San Pedro River, Venezuela, was chosen for study of the magnitude of ecological variations in a river in relation to water quality. Five samples stations were selected on the basis of the agricultural, industrial, and domestic wastes entering the river or on the basis of topographical changes of the land. Routine sampling and analyses were carried on the 12 consecutive months at three times per week. The parameters more frequently used in evaluating the sanitary water quality were determined by: coliforms, fecal coliforms, bacterial density, dissolved oxygen demand, organic nitrogen, ammonia nitrogen, nitrites, nitrates, total residue, fixed residue, volatile residue, filtrable residue, non-filtrable residue and pH. A qualitative and quantitative study was made of the phytoplankton oriented towards calculation of abundance of a group as percentage of total phytoplankton population of each sample. The quantitative and qualitative study of phytoplankton related to non-biological values indicating pollution shows that the ecological condition of this biological group appears to bear a direct relation to the sanitary state of water. Use of phytoplankton as biological community indicators of pollution has value when comprehensive ecological study is made. (Jones-Wisconsin)
W73-08634

URBAN STORMWATER QUALITY AND ITS IMPACT ON THE RECEIVING SYSTEM,
Rex Chainbelt, Inc., Milwaukee, Wis. Ecology Div.
E. H. Bryan.
In: Proceedings of the 20th Southern Water Resources and Pollution Control Conference, April 1-2, 1972, University of North Carolina, Durham, p 38-51. 2 fig, 4 tab, 10 ref.

Descriptors: *Water pollution sources, *Urban drainage, *Storm water, *Water quality, *Municipal wastes, North Carolina, Basins, Biochemical oxygen demand, Chemical oxygen demand, Chlorides, Coliforms, Phosphates, Lead, Rainfall-runoff relationships, Combined sewers, Sediment load, Urban runoff, Storm runoff.
Identifiers: Durham (N.C.), Total solids, Volatile total solids, Tulsa (Okla.).

Results of a study undertaken to characterize urban stormwater from a typical drainage basin in a North Carolina community are presented and compared with those from other locations. The drainage area, a section of the City of Durham, included commercial business districts, an industrial plant, housing districts, shopping center, public recreational park, schools, churches, and a cemetery; the downtown section of an expressway was under final construction. Seventeen storm series provided data representative of rainfall-runoff characteristics for an entire year's precipitation-runoff events. Urban stormwater was concluded to be a significant source of pollutional constituents. The annual contribution of BOD by stormwater was estimated to equal that of the sanitary wastewater effluent from secondary treatment. The contribution of total organic matter, as measured by chemical oxygen demand, was greater than that which would be obtained by discharge of raw, sanitary sewage from a strictly residential, average urban area of the same size. The total solids contribution was substantially larger than would be expected from such discharge of average raw domestic sewage to the stormwater collection and drainage system. Some indications of treatment possibilities are emerging, including alternatives to separation of combined sewer systems. (Jones-Wisconsin)
W73-08635

NONTHERMAL EFFECTS OF MICROWAVE ON ALGAE,
Manitoba Univ., Winnipeg. Dept. of Electrical Engineering; and Manitoba Univ., Winnipeg. Dept. of Botany.
M. A. K. Hamid, and S. Badour.

In: Digest of Papers of the 4th Canadian Medical and Biological Engineering Conference, September 7-9, 1972, Winnipeg, Manitoba, p 48.

Descriptors: *Plant growth, *Microwaves, *Algae, Chlamydonomas, Photosynthesis, Metabolism, Heat, Plant growth regulators, Inhibition.

The thermal and nonthermal effects of microwaves on algae are reported. Algal samples were exposed to microwaves at 2450 MHz for varying periods using appropriately designed waveguide applicators, resulting in either inhibition of photosynthesis or stimulation of the processes depending on culture age of developmental stage. Since microwave treatment is associated with increase in temperature and this injurious effect on photosynthesis is solely due to the thermal effect on microwaves, heated sample control were used which consistently exhibited decrease in photosynthetic capacity of the algae as compared to the control (unheated sample); providing the temperature increases were the same, decreases in photosynthesis were significantly higher than caused by microwaves. Microwaves stimulated photosynthesis, though such stimulation was marked by the injurious effects of heat. Study of the effect of microwaves on developmental stages of the algae to specify the stage which preferentially responds to the ameliorating nonthermal microwave effects and at the same time resists harmful effect of resulting heat is of basic importance. Results provide evidence that microwaves artificially applied or already available in the natural environment may exert a stimulatory effect on plants (primary producers) as concluded from primary results of experiments conducted on Chlamydomonas segnis. (Jones-Wisconsin)
W73-08636

NITROGEN-LIMITED GROWTH OF MARINE PHYTOPLANKTON--II. UPTAKE KINETICS AND THEIR ROLE IN NUTRIENT LIMITED GROWTH OF PHYTOPLANKTON,
Hawaii Inst. of Marine Biology, Honolulu.
J. Caperon, and J. Meyer.
Deep-Sea Research, Vol 19, No 9, p 619-632, 1972. 6 fig, 4 tab, 16 ref.

Descriptors: *Absorption, *Plant growth, *Nutrients, *Marine phytoplankton, *Kinetics, Ammonia, Mathematical models, Growth rates, Sea water, Nitrogen, Culture, Limiting factors.
Identifiers: Luxury uptake, Chemostate cultures, Monochrysis lutheri, Dunaliella tertiolecta, Coccochloris stagnina, Cyclotella nana.

To clarify the relationship between nutrient uptake kinetics and the nutritional experience of the population, these experiments provide reliable estimates of uptake parameters under different nutrient preconditioning regimes. Nitrate uptake experiments were conducted with nitrate-preconditioned Monochrysis lutheri, Dunaliella tertiolecta, Coccochloris stagnina, and Cyclotella nana. Ammonium uptake experiments were conducted with Monochrysis and Dunaliella preconditioned on ammonium. In six of these experiments the growth chamber was inoculated with nitrate and ammonium simultaneously, and the uptake of both was monitored. All cases are well described by the Michaelis-Menten hyperbolas. The two sets of half-saturation constants do not show significant interspecific variation, nor do they show intraspecific variation with different steady-state preconditioning growth rates. The maximum uptake rate parameter shows marked intraspecific variability that is positively correlated with the preconditioning population growth rate. This linear function, combined with the limiting nutrient uptake hyperbola and the relation between growth rate and the nutritional state of the population, as previously developed, provides a model that relates steady-state growth rate to environmental substrate concentration. The evidence suggests that this model would be applicable to field situations for a mixed phytoplankton population in either a nitrate- or ammonium-limited environment. (Jones-Wisconsin)
W73-08638

ON NITROGEN DEFICIENCY IN TROPICAL PACIFIC OCEANIC PHYTOPLANKTON. II. PHOTOSYNTHETIC AND CELLULAR CHARACTERISTICS OF A CHEMOSTAT--GROWN DIATOM,
California Univ., San Diego, La Jolla. Inst. of Marine Resources.
W. H. Thomas, and A. N. Dodson.
Limnology and Oceanography, Vol 17, No 4, p 515-523, 1972. 2 fig, 2 tab, 28 ref.

Descriptors: *Nitrogen, *Productivity, *Deficient elements, *Tropic, Pacific Ocean, Photosynthesis, Diatoms, Growth rates, Chlorophyll, Pigments, Carbon, Cultures, Ammonia, Nutrient requirements, Nutrients, Equations.
Identifiers: *Chemostats, Chaetoceros gracilis, Assimilation ratios.

Varying degrees of nitrogen deficiency for a tropical Pacific diatom, Chaetoceros gracilis, were established and assessed. Cells were grown in a chemostat at varying percentages of the maximum growth rate; at each limited submaximal growth rate, assimilation ratio and various intracellular parameters, such as C:N, carbon:chlorophyll, and carotenoid:chlorophyll ratios were expressed as functions of growth rate; cells may be grown in a chemostat at a constant degree of deficiency. Assimilation ratio (photosynthesis at light saturation per unit chlorophyll) increased with increasing growth rate. Cellular C:chlorophyll ratios decreased with increasing growth rate, but carotenoid: chlorophyll ratios showed no obvious trend. The C:N ratio decreased and chlorophyll: cell increased with increasing growth rate. Parameters measurable at sea are assimilation ratio, C:Chl ratio, and carotenoid:Chl ratio. Most cellular parameters, such as C:N ratio, are difficult to measure in natural communities because of detrital contamination. Steady-state cell numbers were not constant at different growth rates, but decreased as growth rates increased. Growth rates seemed to be controlled by internal nitrogen supplies and the apparent half saturation constant decreased with increasing growth rate. (Jones-Wisconsin)
W73-08639

NITROGEN, PHOSPHORUS AND OTHER INORGANIC MATERIALS IN WATERS IN A GRAVITY-IRRIGATED AREA,
Idaho Univ., Moscow. Dept. of Agricultural Engineering; and Idaho Univ., Moscow. Dept. of Soils.
D. W. Fitzsimmons, G. C. Lewis, D. V. Naylor, and J. R. Busch.
Transactions of the American Society of Agricultural Engineering, Vol 15, No 2, p 292-295, 1972. 5 fig, 5 tab, 12 ref.

Descriptors: *Water pollution, *Nitrogen, *Inorganic compounds, *Irrigation, Phosphorus, Surface waters, Groundwater, Nitrates, Ammonia, Idaho, Fertilizers, Leaching.
Identifiers: *Gravity irrigation, Boise Valley (Idaho), Total solids.

The kinds and amounts of inorganic materials were determined in surface and groundwaters in an intensively-farmed gravity-irrigated area (Boise Valley, Idaho). Water samples, taken throughout the crop growing season were analyzed for nitrate-nitrogen, ammonia, and organic nitrogen, two forms of phosphorus, and total solids. Water samples were collected at 2-week intervals throughout the 1970 season from 79 sites which included 29 farms in four irrigation districts. The mean concentrations of all three forms of nitrogen were found to be relatively low. The mean concentration of each nitrogen form was greater in the surface runoff than in the headwater; the groundwater contained more nitrate-nitrogen than the other water sources, possibly an indication that nitrate is being leached from the soil by percolating irrigation water; this material could also come from feedlots, dairies and septic tank drain fields in the area. The surface runoff also contained the largest concentrations of total phosphorus and total solids. The groundwater was found to contain a relatively large concentration of both ortho and total phosphorus. (Jones-Wisconsin)
W73-08640

LEACHING OF P AND N FROM OHIO SOILS,
Ohio Agricultural Research and Development Center, Wooster.
T. J. Logan, E. O. McLean, B. L. Schmidt, and M. E. Kroetz.
Ohio Report on Research and Development, Vol 51, No 5, p 74-76, 1972. 3 fig, 2 tab.

Descriptors: *Leaching, *Phosphorus, *Nitrogen, *Ohio, Soils, Nutrients, Fertilization, Groundwater.
Identifiers: Wauseon sandy loam, Toledo clay loam, Rossmoyne silt loam.

Studies on extent to which nitrogen and phosphorus are lost from soil and factors affecting this loss reported. Fertilizer phosphate was tagged with P-32, applied at various rates, and subjected to varying rates and intensities of leaching in laboratory studies. Phosphate leaching was investigated in three Ohio soils, sandy loam, clay loam, and silt loam. Since phosphate is strongly adsorbed by soil, leaching is quite restricted. Results suggest that the rate at which phosphorus moves through the soil is dependent on ability of the soil to increase or decrease phosphorus concentration in the soil solution, and on rate at which soil water moves through the soil. In general, only on well-fertilized sandy or organic soils low in phosphorus-fixing capacity would phosphorus leaching be of significance. Field experiments were conducted to determine soil management practices for minimizing nitrogen leaching. Nitrate, unlike phosphate, is not adsorbed by soil, and completely soluble in water, is subject to extensive leaching. The possibility of substantial nitrate leaching from some sandy soils indicates need of careful prediction of nitrogen crop requirements to avoid nitrate excesses in the soil which may subsequently contribute to groundwater contamination. (Jones-Wisconsin)
W73-08641

ALGAL GROWTH IN RELATION TO NUTRIENTS.
Water Pollution Research Lab., Stevenage (England).

In: Pollution of Fresh Waters - Report of the Director 1971, p 25-31. 6 fig, 3 tab, 3 ref.

Descriptors: *Eutrophication, *Water pollution, *Freshwater, *Nutrients, Nitrogen compounds, Silica, Phosphorus compounds, Limiting factors, Oxidation lagoons, Cyanophyta, Reservoirs, Diatoms, Chlorophyll, Ammonia, Chlorophyta, Carbon dioxide, Hydrogen ion concentration, Alkalinity, Temperature, Bicarbonates, Suspended solids, Biochemical oxygen demand, Carbon, Scenedesmus.
Identifiers: Grafham Water (England), Aphanizomenon, Microcystis.

Marked seasonal changes in average concentrations of oxidized nitrogen, silicon, and soluble orthophosphate in the water columns have been observed, particularly during algal blooms and when reservoir was thermally stratified. During the bloom of blue-green algae in July and August 1970, concentrations of oxidized nitrogen and phosphorus fell. During the subsequent diatom

bloom, silicon and phosphorus concentrations declined, increasing again when the bloom ended in December. Between June and September 1970 during the bloom of blue-green algae, algae increases numerically. Chemical and biological data reveal that whenever there is a diatom bloom the silicon content of the water falls, the diatom population, expressed as chlorophyll-a, declines rapidly. When silicon concentration has fallen to 0.4-0.2 mg/l during diatom blooms there is a significant reduction in soluble orthosphosphate concentration, but that of oxidized nitrogen is not markedly affected, and during blue-green algal blooms the soluble orthophosphate is exhausted and oxidized nitrogen concentration falls to about 0.5 mg/l. Investigation of the effects of nutrient loading and retention time on algal growth in lagoons at Rye Meads sewage works showed emergence of a marked relationship between retention time, algal growth, and nutrient depletion in lagoons with continous sewage effluent flow. (Jones-Wisconsin)
W73-08644

PHOSPHORUS AVAILABILITY AND ALKALINE PHOSPHATASE ACTIVITIES IN TWO ISRAELI FISHPONDS,
Kinneret Limnology Lab., Tiberias (Israel); and Mekorot Water Co., Qiryat Shemona (Israel). Analytical Lab.
T. Berman, and G. Moses.
Hydrobiologia, Vol 40, No 4, p 487-498, 1972. 3 fig, 2 tab, 26 ref.

Descriptors: *Phosphorus, *Phosphorus compounds, *Enzymes, Fish, Fish farming, Eutrophication, Productivity, Fertilization, Phytoplankton.
Identifiers: *Orthophosphate, Lake Kinneret (Israel), Alkaline phosphatase, Phosphatase activity.

Three sources of readily available orthophosphate in freshwater are enzymatically hydrolyzed orthophosphate, internal planktonic pools, and orthophosphate present in the water. The levels of these sources in phosphorus-rich fishponds are compared with those found in Lake Kinneret, Israel, during seasons of adequate or limited phosphorus availability. High relative phosphatase activity ratios and relatively large amounts of orthophosphate extracted from plankton by autoclaving indicated adequate, or even excess, levels of phosphorus availablity in the fishponds despite elevated pond productivity. Decreasing routine phosphorus fertilization of these ponds would not adversely affect fish yields but would eventually lower the amounts of phosphorus reaching Lake Kinneret. In general, the relative phosphorus activity ratio may be a useful index to evaluate phosphorus availability for a wide range of natural waters. Values for this ratio of less than 1 and more than 2 appear indicative of limited or adequate phosphorus availability respectively. Although the enzymatically release orthophosphate is always important, relatively greater amounts of orthophosphate are contributed by the other fractions in situations of plentiful phosphorus availability. Activity of free dissolved phosphatases was found in filtered samples of fishpond water. (Jones-Wisconsin)
W73-08646

EUTROPHICATION POTENTIAL OF THE LAKE TAHOE BASIN CALIFORNIA-NEVADA,
Hawaii Univ., Honolulu. Dept. of Civil Engineering.
G. L. Dugan.
In: Water Resources Seminar Series No 1, January 1972, Water Resources Research Center, University of Hawaii, Honolulu, p 3-11. 9 ref.

Descriptors: *Eutrophication, *Water pollution control, Sewage treatment, Reclaimed water.
Identifiers: *Lake Tahoe (Calif-Nev), Effluent export.

Future seasonal and permanent populations will be controlled by zoning regulations to some predetermined number as a measure of eutrophication control of Lake Tahoe. The Lake Tahoe Area Council was formed in the 1950's with the basic function of conducting research and promoting orderly and environmentally sound development around the lake. A consultants' study concluded that municipal sewage posed the greatest threat to the clarity of the lake, prompting a program of effluent export from the basin. After lengthy negotiations, Alpine County agreed to accept the effluent in a proposed 160-acre reservoir located outside of the Tahoe Basin if the effluent met drinking water quality standards; the reservoir would be used for recreations and as a storage facility for irrigation water. One of the most advanced waste water treatment plants, operated by the South Lake Tahoe Public Utilities District (the several processes are listed) purifies the effluent before it is pumped over a 1500-ft. elevation to the Indian Creek Reservoir. A 1966 FWPCA demonstration grant and a 1969 EPA grant resulted in intensive studies (which are described) of the basin. Lake Tahoe should not be the basic criteria for limiting development as when detectable degradation is observed environmental degradation will have already occurred. (Auen-Wisconsin)
W73-08647

ORGANOCHLORINE POLLUTANTS OF THE MARINE ENVIRONMENTS OF HAWAII,
Hawaii Univ., Honolulu. Dept. of Agricultural Biochemistry.
A. Bevenue.
In: Water Resources Seminar Series No. 1, January 1972. Water Resources Research Center, University of Hawaii, Honolulu, p 45-50.

Descriptors: *Pesticides, *Hawaii, Organic pesticides, Water pollution sources, DDT, Chlorinated hydrocarbon pesticides, Dieldrin.
Identifiers: Lindane, Chlordane.

Various water, sediment, algae and fish specimen samples were obtained on Oahu, Hawaii, Kauai and Maui from which pesticide residues were isolated. Preliminary cleanup studies of the biota samples indicated the absence of any polychlorobiphenyl contaminants. Hawaiian rainwater contained p,p'-DDT, dieldrin, and lindane at parts per trillion (ppt) levels. Drinking water contained chlordane, DDT, dieldrin, and lindane in the very low ppt range and about 1/5th, or less, the amounts noted in rainwater. Pesticide residues in non-potable waters were all at the low ppt level, ranging from 0.1 to 64 ppt, with p,p'-DDT representing the highest level. An attempt to classify the sampled areas into two categories of rural and urban sections of the state indicated that the only major difference in residues in the waters was dieldrin, which averaged about seven times higher in the urban areas. Amounts of chlordane and dieldrin found in the waters and sediments and the pentachlorophenol residue observed in the sewage suggests that these pesticides originated primarily in the urban areas where many households and home builders use these materials for termite control. Based on the present pesticide usage pattern, pollution of Hawaii's waters by organochlorine pesticides does not occur to a significant degree. (Auen-Wisconsin)
W73-08651

EFFECTS OF MUNICIPAL WASTE WATER DISPOSAL ON THE FOREST ECOSYSTEM,
Pennsylvania State Univ., University Park. School of Forest Resources.
For primary bibliographic entry see Field 05D.
W73-08731

CONCERNING SOME LITTORAL CLADOCERA FROM AVALON PENINSULA, NEWFOUNDLAND,
Akademiya Nauk SSSR, Moscow. Inst. of Evolutionary Morphology and Animal Ecology.
For primary bibliographic entry see Field 05A.
W73-08762

CULTURED RED ALGA TO MEASURE POLLUTION,
Durham Univ. (England). Dept. of Botany.
For primary bibliographic entry see Field 05A.
W73-08772

DURATION OF VIABILITY AND THE GROWTH AND EXPIRATION RATES OF GROUP E STREPTOCOCCI IN SOIL,
Missouri Univ. Columbia. School of Veterinary Medicine.
For primary bibliographic entry see Field 05B.
W73-08774

VERTEBRATE INSECTICIDE RESISTANCE: IN VIRON AND IN VITRO ENDRIN BINDING TO CELLULAR FRACTIONS FROM BRAIN AND LINER TISSUES OF GAMBUSIA,
Mississippi State Univ., State College. Dept. of Zoology.
M. R. Wells, and O. Yarbrough.
Journal of Agricultural and Food Chemistry, Vol 20, No 1, p 14-16, January-February, 1972. 2 fig, 1 tab, 11 ref.

Descriptors: Fish, *Insecticides, *Endrin, *Resistivity, Animal physiology, Cytological studies.
Identifiers: *Mosquitofish, *Gambusia affinis, *Binding patterns, *Cellular fractions, Brain tissue, Liner tissue.

A comparison was made of the in viro and in vitro binding patterns of endrin -14C in susceptible and resistant Gambusia affinis brain and liner cellular fractions. The resistant fish cell membrane fractions were found to bind more endrin than the cell membrane fractions of susceptible fish. The resistant mitochondria binds less endrin than susceptible fish mitochondria. Possible reasons for endrin resistance in mosquitofish are: differences between endrin uptake in susceptible and resistant fish; retention of endrin by brain cell membranes; a blood-brain barrier; and a structural difference in myelin. (Ensign-PAI)
W73-08801

THE COLUMBIA RIVER ESTUARY AND ADJACENT OCEAN WATERS, BIOENVIRONMENTAL STUDIES.
For primary bibliographic entry see Field 02L.
W73-08816

ASPECTS OF MARINE PHYTOPLANKTON STUDIES NEAR THE COLUMBIA RIVER, WITH SPECIAL REFERENCE TO A SUBSURFACE CHLOROPHYLL MAXIMUM,
Washington Univ., Seattle. Dept. of Oceanography.
For primary bibliographic entry see Field 02L.
W73-08826

DISTRIBUTION OF PELAGIC COPEPODA OFF THE COASTS OF WASHINGTON AND OREGON DURING 1961 AND 1962,
Washington Univ., Seattle. Dept. of Oceanography.
For primary bibliographic entry see Field 02L.
W73-08831

EFFECTS OF THE COLUMBIA RIVER PLUME ON TWO COPEPOD SPECIES,
Oregon State Univ., Corvallis. Dept. of Oceanography.
For primary bibliographic entry see Field 02L.
W73-08832

DISTRIBUTION AND ECOLOGY OF OCEANIC ANIMALS OFF OREGON,
Oregon State Univ., Corvallis. Dept. of Oceanography.
For primary bibliographic entry see Field 02L.
W73-08833

A PRELIMINARY CHECKLIST OF SELECTED GROUPS OF INVERTEBRATES FROM OTTER-TRAWL AND DREDGE COLLECTIONS OFF OREGON,
Oregon State Univ., Corvallis. Dept. of Oceanography.
For primary bibliographic entry see Field 02L.
W73-08835

ECOLOGICAL OBSERVATIONS ON THE BENTHIC INVERTEBRATES FROM THE CENTRAL OREGON CONTINENTAL SHELF,
Oregon State Univ., Corvallis. Dept. of Oceanography.
For primary bibliographic entry see Field 02L.
W73-08836

DISTRIBUTION AND RELATIVE ABUNDANCE OF INVERTEBRATES OFF THE NORTHERN OREGON COAST,
National Marine Fisheries Service, Seattle, Wash. Exploratory Fishing and Gear Research Base.
For primary bibliographic entry see Field 02L.
W73-08837

BATHYMETRIC DISTRIBUTION OF THE ECHINODERMS OFF THE NORTHERN OREGON COAST,
National Marine Fisheries Service, Seattle, Wash. Exploratory Fishing and Gear Research Base.
For primary bibliographic entry see Field 02L.
W73-08838

BATHYMETRIC AND SEASONAL ABUNDANCE AND GENERAL ECOLOGY OF THE TANNER CRAB CHIONOECETES TANNERI RATHBUN (BRACHYURA: MAJIDAE), OFF THE NORTHERN OREGON COAST,
National Marine Fisheries Service, Seattle, Wash. Exploratory Fishing and Gear Research Base.
For primary bibliographic entry see Field 02L.
W73-08839

CHARACTERISTICS OF THE DEMERSAL FISH FAUNA INHABITING THE OUTER CONTINENTAL SHELF AND SLOPE OFF THE NORTHERN OREGON COAST,
National Marine Fisheries Service, Seattle, Wash. Exploratory Fishing and Gear Research Base.
For primary bibliographic entry see Field 02L.
W73-08840

RADIOECOLOGY OF ZINC-65 IN ALDER SLOUGH, AN ARM OF THE COLUMBIA RIVER ESTUARY,
Oregon State Univ., Corvallis. Dept. of Oceanography.
For primary bibliographic entry see Field 02L.
W73-08845

TOTAL PHOSPHORUS AND PHOSPHORUS-32 IN SEAWATER, INVERTEBRATES, AND ALGAE FROM NORTH HEAD, WASHINGTON,
Washington Univ., Seattle. Coll. of Fisheries; and Washington Univ., Seattle. Lab. of Radiation Ecology.
For primary bibliographic entry see Field 02L.
W73-08847

EFFECTS OF STRONTIUM-90 + YTTRIUM-90 ZINC-65, AND CHROMIUM-51 ON THE LARVAE OF THE PACIFIC OYSTER CRASSOSTREA GIGAS,
Washington Univ., Seattle. Coll. of Fisheries; and Washington Univ., Seattle. Lab. of Radiation Ecology.
For primary bibliographic entry see Field 02L.
W73-08848

ZINC-65 IN BENTHIC INVERTEBRATES OFF THE OREGON COAST,
Oregon State Univ., Corvallis. Dept. of Oceanography.
For primary bibliographic entry see Field 02L.
W73-08849

A TEN-YEAR STUDY OF MEROPLANKTON IN NORTH CAROLINA ESTUARIES: AMPHIPODS,
National Marine Fisheries Service, Washington, D.C. Systematics Lab.
For primary bibliographic entry see Field 02L.
W73-08863

SECONDARY PRODUCTION OF SELECTED INVERTEBRATES IN AN EPHEMERAL POND,
Texas A and M Univ., College Station.
P. R. Becker.
Available from Univ. Microfilms, Inc., Ann Arbor, Mich. 48106 Order No. 73-3511. PhD Dissertation, 1972. 154 p.

Descriptors: *Trophic level, *Succession, Temporary pond stage, *Amphipoda, *Rotifers, *Copepods, *Isopods, *Insects, Phosphates, Nitrates, Secondary productivity, Stability, Ponds, Rain, Surface runoff, Mosquitoes.
Identifiers: Species diversity, Orthophosphates, Streptocephalus seali, Diaptomus clavipes, Asellus militaris, Anostraca, Fairy shrimp, Sow bugs.

Between September, 1970 and August, 1971, an ecological study was made of a small ephemeral pond located in Brazos County, south-central Texas. The pond exhibited swift succession of physico-chemical characteristics begween filling and drying. As drying proceeded, there was a general decrease in the total amount of dissolved materials. Concentrations of most materials increased; however, the concentrations of orthophosphate and nitrate decreased. Rainfall and surface runoff modified the above patterns by diluting the concentrations of most materials, but increasing nitrate and orthophosphate. Biotic succession was rapid. Typical ephemeral pond species such as rotifers, copepods, anostracans, and mosquito larvae appeared first. These were followed by amphipods, isopods, insects, and other forms more characteristic of permanent ponds. Secondary production of Streptocephalus seali, Diaptomus clavipes, and Asellus militaris appeared high when compared to published values for similar organisms. The ratio of daily production to standing biomass was initially high, then decreased as the pond dried. It is proposed that the ephemeral pond is maintained in early low maturity stages of succession by the external physical disturbance of drying. The physico-chemical patterns of the pond coupled with the low species diversity and the high ratio of production to standing biomass indicates a system of low maturity and instability. (Little-Battelle)
W73-08903

EFFECTS OF PHENOLIC INHIBITORS ON GROWTH, METABOLISM, MINERAL DEPLETION, AND ION UPTAKE IN PAUL'S SCARLET ROSE CELL SUSPENSION CULTURES,
Oklahoma Univ., Norman.
M. L. Croak.
Available from Univ. Microfilms, Inc., Ann Arbor, Mich. 48106 Order No. 73-4940. PhD Dissertation, 1972. 67 p.

Descriptors: *Inhibitors, *Phenols, *Bioassay, *Cytological studies, Metabolism, Absorption, Ions, Radioactivity techniques, Organic acids, Magnesium, Calcium, Phosphorus, Potassium, Cations, Iron, Manganese, Trace elements, Molybdenum, Inhibition, Carbon radioisotopes.
Identifiers: *Rose cell suspension cultures, Pollutant effects, Growth, Cinnamic acid, p-Coumaric acid, Ferulic acid, Chlorogenic acid, Scopoletin.

Cinnamic, p-coumaric, and ferulic acids were very inhibitory to the growth of rose-cell suspension cultures when present in low concentrations, while chlorogenic acid and scopoletin were effective as inhibitors only at high concentrations. Treatment of 5-day cells with 0.0001 M ferulic acid and 0.00001 M cinnamic acid resulted in altered patterns of incorporation of C-14 from glucose-UL-C-14 into the following cell constituents: amino acids, organic acids, protein, and lipids. The effect of incubation of cells with 0.0001 M ferulic acid on the rate of depletion of Mg, Ca, K, P, Fe, Mn, and Mo ions from the medium during the 14-day growth cycle varied with age of the cells and the ion under consideration. In general, rates of uptake were higher than control rates in older cells and in very young cells and less than control rates in cells 3-5 days old. The degree of inhibition of uptake of Rb-86 also varied with age in cells treated with 0.0001 M ferulic acid. Young (4-5 day) cells showed approximately 50 percent inhibition at higher concentrations of RbCl (system 2) and approximately 25 percent inhibition at lower concentrations of RbCl (system 1). In contrast, the rate of Rb-86 uptake in 10-day cells was not significantly altered by incubation in ferulic acid at either system 1 or system 2. (Holoman-Battelle)
W73-08905

THE ECOLOGY OF SOME ARCTIC TUNDRA PONDS,
Missouri Univ., Columbia.
D. A. Kangas.
Available from Univ. Microfilms, Inc., Ann Arbor, Mich. 48106 Order No. 73-7045. PhD Dissertation, 1972. 343 p.

Descriptors: *Tundra, *Ponds, *Arctic, *Secondary productivity, *Ecology, Alaska, Standing crops, Crustaceans, Aquatic insects, Invertebrates, Biomass, Diptera, Water chemistry, Aquatic plants, Regression analysis, Trophic level, Efficiencies, Correlation analysis, Lake Morphometry, Physical properties, Chemical properties, Waterfleas, Alkalinity, Magnesium, Chlorides, Sodium, Calcium, Conductivity, Mathematical studies, Air temperature, Daphnia, Copepods, Zooplankton, Water temperature, Wind velocity, Hydrogen ion concentration, Carbonates, Phosphates.
Identifiers: Macroinvertebrates, Species density, Macrophytes, Anostraca, Ostracods, Arthropods, Artemia salina, Daphnia middendorffiana, Branchinecta paludosa, Polyartemiella hazeni, Artemiopsis bungei, Arctophila fulva, Ranunculus pallasii, Insolation, Tannin, Orthophosphates, Chlorophyll a.

Seventeen tundra ponds in the northernmost tip of Alaskan tundra were surveyed. Morphometric data were collected for seven of these ponds, and physical and chemical data were gathered for waters in all of them. Daily thermal oscillations were recorded in two ponds and predictive equations were derived by multiple linear correlation between U.S. Weather Bureau data on air temperature, wind direction and speed and insolation. Six water chemistry factors including alkalinity, magnesium, chloride, sodium, calcium and conductivity were significantly correlated by linear regression. Arctophila fulva and Ranunculus pallasii were the more common vascular plants which invaded these ponds. Some 28 genera of phytoplankton were identified in these ponds. Chlorophyll a standing crops ranged between 0.3 and 37 micrograms/l. Numerical standing crop

data were reported for Cladocera, Anostraca, Copepoda, Diptera and Ostracoda. Daphnia middendorffiana, Branchinecta paludosa, Polyartemiella hazeni and Artemiopsis (bungei .) (this species is questioned as a new North American record) were the largest and most apparent organisms in these ponds. Multiple linear regression analyses were run for densities of each of the four dominant species against 16 physical and chemical variables in order to find predictive relationships between these species and the waters in which they were collected. Density of Daphnia middendorffiana was significantly negatively correlated with pH and significantly positively correlated with tannin and lignin-like compounds. Brachinecta paludosa density was significantly negatively correlated with carbonate alkalinity and metaphosphate. Significant positive correlations of B. paludosa density were with orthophosphate, tannin and lignin-like compounds and chlorophyll a standing crops. None of the variables included in the regression analyses were significantly correlated with the densities of Polyartemiella hazeni or Artemiopsis (bungei .). Production was defined as all of the biomass accumulated during an interval of time. Actual production estimates were the lowest on record for Daphnia, ranging between 2.7 and 63.3 mg/sq m for the 75-day study interval. Total production by Branchinectra paludosa ranged between 5.4 and 230.9 mg/sq m. Approximately 28.6 mg/sq m were pruduced by P. hazeni. Two estimates of production by Artemiopsis (bungei .) were 57.4 and 60.8 mg/sq m. (Holoman-Battelle)
W73-08909

EFFECTS OF SIZE-SELECTIVE PREDATION ON COMMUNITY STRUCTURE IN LABORATORY AQUATIC MICROCOSMS,
Texas Univ., Austin.
W. E. Neill.
Available from Univ. Microfilms, Inc., Ann Arbor, Mich. 48106. Order No. 73-7607. Ph D Dissertation, 1972. 191 p.

Descriptors: *Predation, *Algae, Grazing, *Dominant organisms, *Nutrients, Competition, Primary productivity, Biomass, Population, Food habits, Zooplankton, Detritus, Food chains, Crustaceans.
Identifiers: *Species diversity, *Ceriodaphnia quadrangula, Cladocera, Macroinvertebrates.

The impact of size-selective fish predation on competition between crustacean species for limited algal food resources was studied in replicated laboratory microcosms. Data were collected on changes in crustacean population sizes, biomass, and productivity and algal numbers, biomass, and productivity. Supporting data were also collected on changes in crustacean morphology, food consumption patterns, and demographic parameters. Predation on the dominant species (Ceriodaphnia quadrangula) resulted in reduced grazing efficiency on the planktonic algae which in turn resulted in higher productivities and standing crops of plant material as well as reductions in the free nutrient pool. Less efficient grazers were able to use the enhanced supplies of algal resources, and total herbivore diversity, productivity, and biomass increased as a result. Herbivore impact on algal productivity was lower than when the dominant competitor was present and relative losses of algal biomass to grazers were reduced. Instead losses through bacterial (detrital) food chains became more important and both bacterial populations and the amount of nutrients tied up in decaying material increased. The effect of predation on Ceriodaphnia was to reduce competitive pressure on the young of other species, increase juvenile survivorship and development rates, but to increase intraspecific and interspecific competitive pressure on adults, with consequent reductions in adult survivorship and fecundity. These results are discussed in light of recent developments in competition theory, systems modeling, and large scale manipulations of natural communities. Parallels are drawn between the changes in system behavior found in this study and those resulting from predator manipulations in both computer models and natural systems. (Little-Battelle)
W73-08914

NUTRIENT PATHWAYS IN SMALL MOUNTAIN STREAMS,
Georgia Univ., Athens.
For primary bibliographic entry see Field 05B.
W73-08915

SIGNIFICANCE OF CELLULOSE PRODUCTION BY PLANKTONIC ALGAE IN LACUSTRINE ENVIRONMENTS,
Massachusetts Univ., Amherst.
J. Rho.
Available from Univ. Microfilms, Inc., Ann Arbor, Mich. 48106. Order No. 73-6704. Ph D Dissertation, 1972. 112 p.

Descriptors: *Phytoplankton, *Cellulose, *Aquatic algae, *Aquatic environment, Lakes, Chlorophyta, Chrysophyta, Pyrrophyta, Eutrophication, Oligotrophy, Dystrophy, Ponds, Carbohydrates, Dinoflagellates, Plant tissues, Vascular tissues, Bodies of water.
Identifiers: *Fate of pollutants, Particulate matter, Vertical distribution, Absorption spectra.

Numbers and types of cellulose-containing algae were observed in an eutrophic pond, a dystrophic pond and an oligotrophic lake. The cellulose-containing algae, members of Chlorophyceae, Dinophyceae and Chrysophyceae, were estimated to be approximately 70 percent of the total phytoplankton population observed. Fourteen algal species representing the dominant cellulose-containing phytoplankton were investigated for cellulose content which accounted for 2-39 percent on a dry weight basis of the cells studied. The amounts of cellulose present in the water column ranged from 110-1,185 micrograms/l, which accounted for 4-50 percent of the total dry weight of particulate matter. A comparison of absorption spectra of the extracts from algae, higher plants, particulate matter from bodies of water studied and purified cellulose, indicated that the cellulosic material present in particulate matter was of algal origin. It was estimated that less than 30 percent of cellulose in the water column was actually contributed by the viable algal cells present at the time of sampling. There was more cellulose found in the water column than could be accounted for by the number of algal cells observed. (Holoman-Battelle)
W73-08917

POLLUTION OF THE 'EL CARPINCHO' POND (PAMPASIC REGION, ARGENTINA) AND ITS EFFECTS ON PLANKTON AND FISH COMMUNITIES,
La Plata Univ. (Argentina). Instituto de Limnologia.
L. Freyre.
Environmental Pollution, Vol 4, No 1, p 37-40, January 1973. 3 tab, 2 ref.

Descriptors: Water pollution effects, *Waste water (Pollution), *Industrial wastes, *Zooplankton, Freshwater fish, Chemical analysis, Water pollution sources, Dairy industry, Catfishes, Silversides, Biological communities, Lead, Iron, Nitrates, Phosphates, Heavy metals, Pollutants, Chlorides, Biochemical oxygen demand, Odor, Sodium, Organic wastes, South America, Lakes.
Identifiers: *El Carpincho Pond, *Basilichthys bonariensis, *Parapimelodus valenciennesi, Plastic bag factory, *Argentina, Sulfites, Species diversity index.

A pond in the Southern Pampasic region of Argentina, 'El Carpincho', with highly developed fishing and other recreational activities, has been polluted since 1969 by the effluents from three industrial plants (milk processing plant, plastic bag factory, and an establishment for washing cattle trucks). The effects of this on the plankton and fish communities were investigated. Chemical analyses showed an increase in Na and sulfite, nitrates and phosphates. Lead and iron were detected in the water for the first time, and there was a high BOD and chloride demand, with an objectionable odor in wastes from the milk industry. Changes in the Mg/Ca ratio caused a reduction in the density of zooplankton, and in the numbers of the freshwater argentine silverside fish (Basilichthys bonariensis). On the other hand, an explosive increase in catfish (Parapimelodus valenciennesi) was observed. The diversity index for the relative composition of the fish fauna rose from 0.3093 in 1966 to 1.9384 in 1970. (Holoman-Battelle)
W73-08927

INTERTIDAL SUBSTRATE RUGOSITY AND SPECIES DIVERSITY,
University of Southern California, Los Angeles.
M. J. Risk.
Available from Univ. Microfilms, Inc., Ann Arbor, Mich. 48106. Order No. 73-763. Ph D Dissertation, 1972. 92 p.

Descriptors: *Intertidal areas, Standing crops, Aquatic habitats, Water levels, Tropical regions, California, Virgin Islands, Indicators, Aquatic populations, Tidal waters.
Identifiers: *Species diversity, *Rugosity, *Substrates, Panama, Marine environment.

A study of the relationship in the middle and upper intertidal between small-scale rugosity and species diversity was undertaken, restricting sample substrates to basalt flows. A total of fifty-five samples was taken in Panama and the Virgin Islands, and on the coasts of California and Baja, California. Species diversity was calculated both by numbers of individuals and by ash-free dry weights. Duplicates of the rock surfaces were produced by a technique involving field molding with an alginate impression material, casting a positive with plaster of paris, and finally producing a negative with latex compound. Rugosity was determined by calculating the variance of the differences between profile heights on the original surface and smoothed profile heights produced by taking a moving average of the original profile heights. Values for tidal height, total surface area exposed, standing crop (both in numbers and in weights) and latitude were also obtained for each sample area. Results indicate that the measured environmental parameters are much better predictors of weight species diversity than of number species diversity. Both measures of diversity correlate strongly with rugosity, and not as strongly (or not at all) with total surface area exposed. Rugosity is seen to increase with a decrease in tidal height, perhaps as a result of wave action and biological boring and rasping activities. Tropical intertidal diversity is low, and tropical areas seem to have lower species-carrying abilities. The tropical intertidal seems then to be an exception to the generally noted diversity increase in the tropics. (Holoman-Battelle)
W73-08928

THE EFFECT OF OIL POLLUTION ON SURVIVAL OF THE TIDAL POOL COPEPOD, TIGRIOPUS CALIFORNICUS,
California State Univ., Northridge. Dept. of Biology.
J. E. Kontogiannis, and C. J. Barnett.
Environmental Pollution, Vol 4, No 1, p 69-79, January 1973. 6 fig, 19 ref.

Descriptors: *Water pollution effects, *Oil pollution, Copepods, Bioassay, Toxicity, Crustaceans, Invertebrates, Sea water, Mortality, Oxygen, Air-water interface, Inhibition, Diffusion, Laboratory tests.

Identifiers: *Crude oil, *Mineral oil, *Tigriopus californicus, *Survival, Harpacticoids.

An investigation was undertaken to determine if the survival of Tigriopus californicus, a harpacticoid copepod, is affected by crude oil contamination and, if so, to determine whether death is caused mainly by oil acting as a physical barrier to O2 transfer between air and water or because of the presence of toxic chemicals in the oil itself. The experiments conducted involved subjecting adult copepods to (1) crude or mineral oil in sea water, with or without bubbling, at 17.5C in the dark for 1-7 days; and (2) crude or mineral oil as a surface film on partially deoxygenated sea water. A 1.5 mm thick layer of crude oil on the water surface caused the death of all animals within three days, while a similar layer of mineral oil resulted in complete mortality in five days. When oxygen was added to the water containing crude oil, total mortality was delayed by two days. Approximately 100 percent mortality was extended to seven days when crude oil was enclosed in a dialysis membrane bag immersed in the water and oxygen was supplied. When mineral oil was used and air provided, the animals survived as well as the controls. It was concluded that death resulted because the oil acts as a barrier to oxygen transfer between air and water, and because it contains substances toxic to Tigriopus. (Holoman-Battelle)
W73-08929

PHOSPHORUS DYNAMICS IN LAKE WATER,
Toronto Univ. (Ontario). Dept. of Zoology.
For primary bibliographic entry see Field 05B.
W73-08931

GROWTH AND SURVIVAL OF ANURAN TADPOLES (BUFO BOREAS AND RANA AURORA) IN RELATION TO ACUTE GAMMA RADIATION, WATER TEMPERATURE, AND POPULATION DENSITY,
Washington State Univ., Pullman.
J. L. Fish.
Available from Univ. Microfilms, Inc., Ann Arbor, Mich. 48106 Order No. 73-44. PhD Dissertation, 1972. 91 p.

Descriptors: *Bioassay, *Water temperature, *Gamma rays, *Growth rates, Water pollution effects, Frogs, Toads, Laboratory tests, Radioactivity effects, Thermal stress, Amphibians, Radiation, Electromagnetic waves, Animal populations, Larval growth stage.
Identifiers: *Tadpoles, Rana aurora, Bufo boreas, Survival, *Population density, Continuous flow techniques.

Effects on growth and survival of anuran tadpoles (Bufo boreas and Rana aurora) in relation to acute gamma radiation, water temperature, and population density were studied in continuous-flow laboratory test chambers utilizing a factorial randomized block design. Approximately one week after hatching, tadpoles were exposed to radiation doses ranging from 0-2000 Roentgen (R), then reared for 28 days at three temperatures (15, 20, or 25 C) and at four densities (5, 15, 35, or 100 animals). Survivors were measured (total length) and counted weekly. Comparisons between species indicated that R. aurora was more radio-sensitive than B. boreas. Densities greater than 35 animals in a half gallon of water significantly slowed growth and adversely affected survival. There appeared to be increased radiation damage at greater densities. Growth and survival were enhanced by higher temperatures, and radiation damage developed faster at higher temperatures. A temperature of 25 C with densities greater than 35 animals slowed growth in B. boreas. The three-way interaction of these variables was not conclusively demonstrated. (Holoman-Battelle)
W73-08934

GROWTH AS RELATED TO INGESTION IN A STREAM ISOPOD, LIRCEUS BRACHYURUS (HARGER) FED A MACROPHYTE OR PERIPHYTON,
Pennsylvania State Univ., University Park.
C. L. Hawkes.
Available from Univ. Microfilms, Inc., Ann Arbor, Mich. 48106 Order No. 72-33,170. Ph D Dissertation, 1972. 57 p.

Descriptors: *Food habits, *Growth rates, *Isopods, *Periphyton, Invertebrates, Crustaceans, Digestion, Radioactivity techniques, Cobalt radioisotopes, Aquatic plants, Aquatic weeds, Animal growth.
Identifiers: Lirceus brachyurus, Elodea canadensis, *Ingestion rates, *Macrophytes, Macroinvertebrates, Waterweeds.

The roles of a macrophyte Elodea canadensis and periphyton as food for the isopod Lirceus brachyurus were compared by investigating growth as related to ingestion. Ingestion rates, growth rates, percentage growth rates, and the ratios of growth rates to ingestion rates were obtained for isopods fed these two plant types. Ingestion was measured using C-60 labeled plants with a method involving a one hour feeding period and a direct counting of the whole live animal with the radioactive meal. Growth was based on the area of the frontal outline of each isopod calculated by multiplying the length by the width of a calibrated photographic image of the animal. Ingestion rates for small and medium sized isopods feeding on the macrophyte were significantly higher than those on periphyton with the medium sized animals having the largest difference. The highest growth rates and percentage growth rates were obtained when the isopods were fed periphyton. The ratios of growth rates to ingestion rates were higher for all size classes of isopods fed periphyton. (Holoman-Battelle)
W73-08936

SEASONAL SUCCESSION OF PHYTOPLANKTON AND A MODEL OF THE DYNAMICS OF PHYTOPLANKTON GROWTH AND NUTRIENT UPTAKE,
Wisconsin Univ., Madison.
J. F. Koonce.
Available from Univ. Microfilms, Inc., Ann Arbor, Mich. 48106 Order No. 72-24,888 Ph D Dissertation, 1972. 204 p.

Descriptors: *Phytoplankton, *Mathematical models, *Growth rates, *Absorption, *Nutrients, Plant populations, Aquatic environment, Lentic environment, Carbon, Nitrogen, Phosphorus, Marine algae, Aquatic algae, Model studies, Cytological studies, *Wisconsin, Ecosystems, Water temperature, Light intensity, Mathematical studies, Plant physiology, Plant morphology, Chlorophyta.
Identifiers: *Seasonal succession, Marine environment, Silicon, *Lake Wingra (Wisconsin), Selenastrum capricornutum, Unialgal culture, Desmids.

Seasonal succession in phytoplankton associations has been observed in freshwater and marine lentic environments. The appearance and disappearance of algal populations has been correlated with variations in physical, chemical, and biological factors in aquatic ecosystems. To study the succession of phytoplankton, a series of weekly observations for one year were made at Lake Wingra, Madison, Wisconsin. In addition to enumeration and identification of phytoplankton species, analyses were conducted for major algal nutrients (Si, C, N, and P), and light and temperature were measured. The results revealed species' succession and nutrient depletion patterns similar to other lakes. Proceeding from an assumption that growth optimization was the dominant process in the observed succession pattern, a mathematical model was derived from theoretical considerations of algal physiology. The prediction of the model was rate of algal growth, and model parameters were related to efficiencies of biological processes (such as nutrient uptake). The model was tested against unialgal cultures of Selenastrum capricornutum and was found to predict adequately the time course of algal growth and uptake on N and P in batch cultures of algae. The verified model was then related to morphological variation and physiological adaptation of phytoplankton species. Through appropriate use of mathematical optimization routines, model parameters could be varied to simulate maximum growth rates under an imposed set of nutrient concentrations (such as low P and high N or low N and high P concentrations). By relating values of model parameters to cell morphology and physiological adaptation such procedure suggests the possibility of predicting morphological variation--this succession of phytoplankton populations. The derived model is useful only for variation in concentration of N and P. (Holoman-Battelle)
W73-08938

REGROWTH OF COLIFORMS AND FECAL COLIFORMS IN CHLORINATED WASTEWATER EFFLUENT,
Hadassah Medical School, Jerusalem (Israel). Environmental Health Lab.
H. I. Shuval, J. Cohen, and R. Kolodney.
Water Research, Vol 7, No 4, p 537-546, April 1973. 7 fig, 14 ref.

Descriptors: *Coliforms, *Waste water (Pollution), *Chlorination, *Sewage effluents, Environmental effects, On-site investigations, Laboratory tests, Water quality control, Enteric bacteria, Chlorine, Water sampling, Water analysis, Disinfection, Bactericides, Reservoir storage, Aerobic bacteria, Pathogenic bacteria.
Identifiers: *Fecal coliforms, *Regrowth, Survival, Biochemical tests, Growth.

Observations made both in the field in chlorinated effluent, and in laboratory experiments show that coliforms and fecal coliforms are capable of regrowth in chlorinated wastewater. Under field conditions regrowth of coliforms in chlorinated effluent held in a storage reservoir for about 3 days appeared inversely correlated to: (1) the residual chlorine in the storage reservoir and (2) the number of coliforms surviving chlorination. In the laboratory experiments regrowth occurred after initial doses as high as 11 ppm total chlorine even when there was no chemical inactivation of the chlorine. Fecal coliforms did not generally show regrowth to the same extent as coliforms. Regrowth occurred even when coliforms were not detectable in 10-ml of samples after chlorination. Since coliforms and fecal coliforms are capable of regrowth in chlorinated sewage effluent and adminstures of it, the sanitary significance of the number of coliforms after storage or in receiving bodies of water is difficult to interpret. Thus standards might be based on the number of coliforms, or fecal coliforms detected in effluents immediately after chlorination. However, this would not be justified if in addition to coliforms, pathogenic bacteria can regrow in chlorinated effluents. (Holoman-Battelle)
W73-08939

THE DYNAMICS OF BROWN TROUT (SALMO TRUTTA) AND SCULPIN (COTTUS SPP.) POPULATIONS AS INDICATORS OF EUTROPHICATION,
Michigan State Univ., East Lansing.
For primary bibliographic entry see Field 05A.
W73-08940

MOLECULAR ARCHITECTURE OF THE CHLOROPLAST MEMBRANES OF CHLAMYDOMONAS REINHARDI AS REVEALED BY

HIGH RESOLUTION ELECTRON MICROSCOPY,
California Univ., Los Angeles.
F. L. Kretzer.
Available from Univ. Microfilms, Inc., Ann Arbor, Mich. 48106 Order No. 73-1711. Ph D Dissertation, 1972. 78 p.

Descriptors: *Molecular structure, *Cytological studies, *Biological membranes, Electron microscopy, Chlorophyta, Aquatic algae, Protozoa, Methodology.
Identifiers: *Chlamydomonas reinhardi, *High resolution electron microscopy, *Chloroplasts, Sample preparation, Ultrastructure, Flagellates.

The chloroplast membranes of Chlamydomonas reinhardi were prepared for thin section, high resolution electron microscopy with the specific goal of minimally denaturing the protein and with the least lipid solubilization possible. This precluded all conventional procedures (OsO4, KMnO4, high concentrations of glutaraldehyde, and acetone or ethanol dehydration). The scheme first used by Sjostrand and Barajas was adapted to this system: membrane proteins were first cross-linked with a very short exposure to 1 percent glutaraldehyde, dehydrated a short time in cold ethylene glycol, and infiltrated with Vestopal. After such a preparatory procedure, the partition membranes were 270A thick, nearly three times the thickness of the membranes preserved by conventional proceudres. The 270A-thick partition membranes showed a heterogeneous (10-100A) globular substructure. It is proposed that the substructure is the enzymatic and structural protein of the thylakoids. The parameters of the original Sjostrand-Barajas preparatory scheme were varied, and the chloroplast membranes responded like a system sensitive to the phenomena of protein denaturation. The membrane varied consistently from 100-270A depending on the denaturing potential of the 'fixative' and the hydrophobic character of the dehydrating agent. (Holoman-Battelle)
W73-08942

ACUTE TOXICITY OF HEAVY METALS TO SOME MARINE LARVAE,
Ministry of Agriculture, Fisheries and Food, Burnham-on-Crouch (England). Fisheries Lab.
P. M. Connor.
Marine Pollution Bulletin, Vol 3, No 12, p 190-192, December 1972. 2 fig, 3 tab, 6 ref.

Descriptors: *Toxicity, *Heavy metals, *Larval growth stage, *Shellfish, *Crustaceans, *Mollusks, Larvae, Copper, Mercury, Zinc, Oysters, Shrimp, Crabs, Invertebrates, Bioassay, Lethal limit, Lobsters, Mortality, Mature growth stage, Marine animals, Laboratory tests.
Identifiers: *Median tolerance limit, Sensitivity, Ostrea edulis, Crangon crangon, Carcinus maenas, Homarus gammarus, Macroinvertebrates.

The toxicity of copper, mercury and zinc to the larvae of oysters, shrimp, crab and lobsters has been examined over periods of up to 64 hours. Mercury was found to be more toxic than copper and zinc, which had similar levels of toxicity. Over the experimental period, the relationship between toxicity and concentration was linear. Larvae were from 14 to 1,000 times more susceptible than adults of the same species. The median lethal concentrations (LC50) of each metal to the most sensitive species of larvae, tested over a 48 hour period, exceeded the concentrations found in natural sea water by a factor of 100. For longer test periods, the LC50 would be considerably less and this factor would then be considerably reduced. Hence the continued addition of these metals to confined waters should give cause for concern. (Holoman-Battelle)
W73-08943

EFFECTS OF DIELDRIN ON WALLEYE EGG DEVELOPMENT, HATCHING AND FRY SURVIVAL,
Ohio State Univ., Columbus.
E. M. Hair.
Available from Univ. Microfilms, Inc., Ann Arbor, Mich. 48106 Order No. 73-2012. Ph D Dissertation, 1972, 52 p.

Descriptors: *Bioassay, Absorption, *Fish eggs, *Dieldrin, *Mortality, Animal physiology, Fry, *Walleye, Pesticide toxicity, Water pollution effects, Laboratory equipment, Growth rates, Hatching, Fish physiology.
Identifiers: *Bioaccumulation, Biological magnification.

The objectives were to determine whether walleye eggs absorb dieldrin from water during incubation, and if so, whether uptake is concentration-dependent, and whether absorbed dieldrin affects embryo hatchability, or fry development and survival through the yolk sac stage. Eggs were reared in a miniature jar hatchery and were continuously exposed to 0.0, 1.0, 10.0, or 100.0 ppb dieldrin from spawning until hatching. Water and egg samples were taken daily to monitor HEOD concentration and embryo development. After hatching fry were held in glass battery jars until yolk sac absorption was complete. Samples were taken daily to monitor their development and HEOD content. Eggs absorbed dieldrin from the water at all levels of exposure. The amount absorbed depended on the concentration in water and varied with the duration of exposure. Corresponding with the appearance of eyes in the embryos there was a sharp increase in dieldrin uptake. After 5 days of exposure eggs had concentrated levels in the water by factors of 800 (exposure to 1 ppb), 1210 (10 ppb), and 914 (100 ppb). Dieldrin absorbed by developing walleye eggs did not affect embryo development, rate of development or hatchability. At the higher levels of exposure (10 and 100 ppb) fry survival was affected. After exposure to 10 or 100 ppb, fry became pigmented sooner and were more active than the controls. (Little-Battelle)
W73-08944

TRACE METAL RELATIONSHIPS IN A MARINE PELAGIC FOOD CHAIN,
Stanford Univ., Calif.
G. A. Knauer.
Available from Univ. Microfilms, Inc., Ann Arbor, Mich. 48106 Order No. 73-4534. Ph D Dissertation, 1972, 156 p.

Descriptors: *Heavy metals, *Food chains, *Phytoplankton, *Zooplankton, *Fish, Absorption, Water analysis, Sea water, Cadmium, Copper, Manganese, Lead, Zinc, Sodium, Magnesium, Calcium, Potassium, Strontium, Aluminum, Iron, Nickel, Titanium, Organic compounds.
Identifiers: *Biological magnification, *Bioaccumulation, Atomic absorption spectrophotometry, Biological samples, Barium, Silver, Anchovy, Silicon.

Surface water samples collected over a one year period from Monterey Bay, California were analyzed for Cd, Cu, Mn, Pb and Zn. Mixed phytoplankton and zooplankton samples were analyzed for Na, Mg, Ca, K, Sr, Si (phytoplankton), Ba, Al, Zn, Fe, Cu, Mn, Ni, Ti, Ag, Cd, and Pb. Samples of the northern anchovy Engraulis mordax were analyzed for Pb, Cd, Ag, Ni, Mn, Cu, Fe, Zn, Al, and Ba. Analysis was by conventional atomic absorption spectrometry. Phytoplankton samples were separated into acid soluble and silica fractions before analysis. The acid soluble fraction contained large amounts of Na, K, Mg, Ca and Si and low concentrations of the remaining elements. Titanium usually was not detected in this fraction. In the silica fraction, Na, K and Mg were found to have the highest concentrations followed by Al, Ca, Fe and Sr. The lowest levels found in this fraction were for the elements Cu and Zn with Ba, Mn and Cd detected only occasionally. The metals Pb, Cd, Ag, Ni, Mn, Cu, Fe, Zn, Al and Ba were also compared in phytoplankton, zooplankton and anchovy samples in order to determine existing relationships in this simple food chain. In general, concentrations of biologically active metals were relatively constant in all three trophic levels. For non-biologically active metals (e.g., Cd, Ni, Pb) little evidence for food chain amplification was found. Phytoplankton concentration factors (relative to seawater) were found to be highest for Pb, Fe, Si, Cd, Al, and Ti respectively while relatively low values were obtained for Ba, Zn, Cu, Mn, Ni and Ag. Except for K, Sr, and Ba, the alkali and alkaline earth metals were not concentrated relative to seawater. Mercury levels in this food chain were also found to be low. (Little-Battelle)
W73-08947

TOXIC EFFECTS OF CUPRIC, CHROMATE AND CHROMIC IONS ON BIOLOGICAL OXIDATION,
Calgary Univ. (Alberta). Dept. of Chemical Engineering.
A. Lamb, and E. L. Tollefson.
Water Research, Vol 7, No 4, p 599-613, April 1973. 13 fig, 3 tab, 10 ref.

Descriptors: *Toxicity, *Cations, *Chromium, *Copper, *Activated sludge, Laboratory tests, Suspended solids, Sewage bacteria, Microbial degradation, Chemical analysis, Heavy metals, Aqueous solutions, Biodegradation, Sludge digestion, Biochemical oxygen demand, Dissolved oxygen, Nutrients.
Identifiers: Pollutant effects, *Biological oxidation, Substrate utilization, Substrate concentration, Fate of pollutants, Atomic absorption spectrophotometry, Glucose, Total carbon analyzer.

Using a completely mixed, continuously operated, lightly loaded, laboratory activated sludge system, the toxic effects of cupric, chromic and chromate ions under conditions of shock loading were observed. These were determined with the aid of a total carbon analyzer and simple mass balance techniques in terms of conversion of the organic nutrient fed. The distribution of the metal ion between aqueous solution and suspended solids was measured using atomic absorption spectrophotometry. Toxic effects were in the order: cupric greater than chromate greater than chromic while the reductions in conversion were 90, 50 and 20 percent, respectively, for concentrations of 5 ppm metal ion. Cupric ion toxicity was directly proportional to the weight of copper absorbed per unit mass of suspended matter within the total copper concentration range (0-5.5 ppm) studied. This toxicity decreased markedly with increased suspended solids concentration: an 80 percent decrease in conversion at 210 ppm suspended solids was reduced to a negligible quantity (3 percent) by increasing the suspended solids to 4000 ppm. At 210 ppm suspended solids, 34 percent of the added copper was removed by the sludge in 7 h. The results suggest that the toxic effect of metal ions on a sewage plant activated sludge system could be reduced by rapidly increasing the suspended solids concentration, possibly by the addition of dried sludge. This work supports a mechanism involving rapid adsorption of the cupric ion by both viable and dead sludge followed by a slower rate determining step resulting in the toxic effect. The first order rate constant for substrate utilization was found to be 1.07 plus or minus 0.6/hr. (Holoman-Battelle)
W73-08948

THE EFFECT OF PASSAIC RIVER BENTHAL DEPOSITS ON DEOXYGENATION IN OVERLYING WATERS,
Rutgers - The State Univ., New Brunswick, N.J.
For primary bibliographic entry see Field 05G.
W73-08949

STUDIES ON THE OCCURRENCE, PHYSIOLOGY, AND ECOLOGY OF BIOLUMINESCENCE IN DINOFLAGELLATES,
Oregon State Univ., Corvallis.
W. E. Esaias.
Available from Univ. Microfilms, Inc., Ann Arbor, Mich. 48106 Order No. 73-7826. Ph D Dissertation, 1973. 87 p.

Descriptors: *Dinoflagellates, *Bioluminescence, *Environmental effects, *Physiological ecology, Pyrrophyta, Marine algae, Protozoa, *Oregon, Plant physiology, Animal physiology, Ecology.
Identifiers: *Yaquina Bay, Flagellates, Ceratium fusus, Gonyaulax digitale, Gonyaulix catenella, Gonyaulax acatenlla, Gonyaulax tamarensis, Peridinium depressum, Gonyaulax triacantha, Photoinhibition.

To provide further information on the occurrence and geographical variations of bioluminescent capabilities of marine dinoflagellates, forty species, representing twelve genera, of dinoflagellates from Yaquina Bay, Oregon, were examined for bioluminescence as single cell isolates. Seventeen species from the genera Ceratium (1 sp.), Gonyaulax (3 sp.), and Peridinium (13 sp.) were found to be bioluminescent. Ceratium fusus was the only member of the genus found to emit light; G. triacantha was found to be non-bioluminescent. The total photon emission of each luminescent species is reported. Values ranged from 10,500,000,000 photons per P. depressum to 21,000,000 photons per G. digitale. As a taxon, the genus Peridinium emitted more light by an order of magnitude than did Ceratium or Gonyaulax. The mechanically stimulable bioluminescence of members of the Gonyaulax catenella group can be photoinhibited completely by exposure to as little as 10 trillion quanta/sq cm delivered as a pulse of width between 0.1 and 10 seconds. There is an initial time lag of one minute, followed by a first order decay to approximately one percent of the bioluminescence of unexpected controls. The half time of this decay is only 50 seconds. Action spectra for photoinhibition in Gonyaulax catenella, G. acatenalla, and G. tamarensis revealed a single absorption band with a maximum of 562 nm. Grazing experiments were conducted with three calanoid copepods and three species of bioluminescent dinoflagellates, using procedures which yielded samples of cultures with high and low capacities for mechanically stimulable bioluminescence. In all cases the ingestion rates were lower for the high bioluminescent capacity samples than for the samples having a reduced bioluminescent capacity. These results indicate that dinoflagellate bioluminescence has survival value as a defense against copepod grazing. (Holoman-Battelle)
W73-08953

ON THE MICROBIOLOGY OF SLIME LAYERS FORMED ON IMMERSED MATERIALS IN A MARINE ENVIRONMENT,
Hawaii Univ., Honolulu.
G. E. Sechler.
Available from Univ. Microfilms, Inc., Ann Arbor, Mich. 48106 Order No. 73-5276. Ph D Dissertation, 1972. 114 p.

Descriptors: Sampling, *Artificial substrates, *Sea water, *Diatoms, *Bacteria, *Microscopy, *Pollutant identification, Adsorption, Zinc, Aluminum.
Identifiers: Glass, Plexiglass, Wood, Stainless steel, Steel, Monel, Phosphor bronze, Teflon overlay technique, Parlodion filming technique.

Three separate techniques were used to investigate the development of microorganisms in primary films found on various materials immersed in marine waters. These included microbial viable counts by the traditional swabbing method, and total visible counts by two new direct microscopic observation techniques developed during this study: the Teflon overlay technique and the Parlodion filming technique. A variety of test materials were investigated, including glass, plexiglass, wood, zinc, stainless steel, steel, Monel, aluminum, and phosphor-bronze. Test panels were immersed for intervals ranging from 1 hour to 40 days. Although similar varieties of aerobic heterotrophic bacteria were found on all surfaces regardless of their chemical nature, viable population levels were characteristic of each test material during the first few days following immersion. Wood accumulated the greatest number of bacteria in the shortest period of time (within 3 days). Bacteria were found to attach to Teflon membranes over-lying test surfaces by 1 day and to proliferate in situ by at least 4 days. Using the Parlodion filming technique it was found that the number of bacteria per sq cm of test panel could be accurately determined within the first 10 days after immersion. Diatom counts were accurate for 24 days, while extraneous particle counts were valid at least 75 days. No stable diatom population was recognized on any test surface until 6 days after immersion, indicating that bacterial growth may prepare the test surface for the development of unicellular algae. The more chemically passive test panels (glass, plexiglass, and stainless steel) consistently exhibited the highest diatom population level up to 16 days after immersion. (Little-Battelle)
W73-08955

A COMPARATIVE STUDY OF THE DECOMPOSITION OF CELLULOSIC SUBSTRATES BY SELECTED BACTERIAL STRAINS,
Massachusetts Univ., Amherst.
For primary bibliographic entry see Field 05B.
W73-08957

PERIPHYTON PRODUCTION AND GRAZING RATES IN A STREAM MEASURED WITH A P-32 MATERIAL BALANCE METHOD,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 05A.
W73-08958

CESIUM-137 AND STABLE CESIUM IN A HYPEREUTROPHIC LAKE,
Michigan State Univ., East Lansing.
L. D. Eyman.
Available from Univ. Microfilms, Inc., Ann Arbor, Mich. 48106 Order No. 73-5367. Ph D Dissertation, 1972. 113 p.

Descriptors: Ecosystems, Lakes, *Eutrophication, *Path of pollutants, *Stable isotopes, *Radiochemical analysis, *Cesium, Water analysis, Aquatic plants, Aquatic algae, Zooplankton, Freshwater fish, Lake sediments, Aquatic environment, Soil analysis, Aquatic soils, Trophic level.
Identifiers: *Cs-137, Cesium radioisotopes, Macrophytes, Fate of pollutants.

The inputs of Cs-137 and stable Cs and their distribution among the various components of an aquatic ecosystem were studied in a lake exhibiting an advanced stage of eutrophy. Components sampled and analyzed for these two isotopes of cesium included water, sediments, macrophytes, filamentous algae, zooplankton, and several species of fish. Most of the cesium pool (87 percent Cs-137; 98 percent Cs) was associated with the sediments. A trend of increased Cs-137 concentration at higher trophic levels was demonstrated for those fish that are free-ranging limnetic feeders. No such trend was evident for stable Cs. Forms closely associated with sediments had higher Cs-137 concentrations than expected based on their feeding habits. On the dates samples were collected, specific activity in limnetic fishes was constant but was variable in other forms. The degree of association of biotic forms with sediments was reflected in their specific activity. (Holoman-Battelle)
W73-08959

BIOLOGICAL NITROGEN FIXATION IN LAKE MENDOTA,
Wisconsin Univ., Madison.
M. L. S. Torrey.
Available from Univ. Microfilms, Inc., Ann Arbor, Mich. 48106 Order No. 72-27,352. Ph D Dissertation, 1972. 452 p.

Descriptors: *Nitrogen fixation, *Bacteria, *Phytoplankton, *Cyanophyta, Water temperatures, Dissolved oxygen, Hydrogen ion concentration, Sediments, Phosphates, Nitrogen, Ammonia, Eutrophication, Depth, Light, Statistical methods, Algae, Lakes, *Wisconsin.
Identifiers: *Acetylene reduction, *Lake Mendota (Wis), Orthophosphates, Wisconsin.

The study investigated the validity of prior estimates of N fixation in Lake Mendota, the factors influencing algal fixation, and the possibility of heterotrophic fixation in the sediments and the water column. All nitrogen fixation studies were performed with acetylene. In addition the ratio of acetylene reduced to nitrogen was estimated. Physical, chemical, and biological analyses were performed at each depth sampled. Short, medium, and long-term studies all showed that heterocyst content was significantly related to the activity and efficiency of acetylene reduction. In long-term studies, temperature was positively correlated with acetylene reduction activity and efficiency. The depth at which the sample was collected was negatively correlated with acetylene reduction activity and efficiency. Dissolved oxygen had a positive regression coefficient in the multiple linear regression analysis of acetylene reduction. pH also was related to acetylene reduction. Available data do not distinguish whether dissolved oxygen and pH were affecting acetylene reduction or whether these were a result of changes in water quality caused by active photosynthesis. Bacterial acetylene reduction activity in the waters from which colonial phytoplankton had been removed was very low. Sediment acetylene reduction activities were also low, but can be significant over a long period of time. Nitrogen fixation contributed about ten percent or about 39,800 kg of the annual input of nitrogen to Lake Mendota during 1970 and 1971. While this is much less significant than groundwater, rural runoff, or dry fallout, most of it is added at a period of time when combined nitrogen is depleted and thus may be significant during the summer months in maintaining blue-green algal nuisances in the surface waters. (Little-Battelle)
W73-08962

EXCRETION MEASUREMENTS OF NEKTON AND THE REGENERATION OF NUTRIENTS NEAR PUNTA SAN JUAN IN THE PERU UPWELLING SYSTEM DERIVED FROM NEKTON AND ZOOPLANKTON EXCRETION,
Washington Univ., Seattle.
For primary bibliographic entry see Field 05B.
W73-08963

CHARACTERIZATION OF SEVERAL THYMINE-REQUIRING MUTANTS OF ESCHERICHIA COLI Y MEL,
New Hampshire Univ., Durham.
J. H. Maryanski.
Available from Univ. Microfilms, Inc., Ann Arbor, Mich. 48106 Order No. 73-4362. Ph D Dissertation, 1972. 236 p.

Descriptors: *Cultures, *E. coli, Separation techniques, Pollutant identification, Growth rates.
Identifiers: *Culture media, Thymidine, Thymidilic acid, Agars, Tryptophan, Thymine, Mutants.

Escherichia coli Y melT (-), E. coli B27T (-), and E. coli B9T (-) were isolated from E. coli Y mel, E. coli B27, and E. coli B9, respectively, by trimethoprim selection. E. coli B27 and E. coli B9 were tryptophan delection mutants derived from E. coli Y mel. Mutants, E. coli Y melT (-), E. coli

B27T (-), and E. coli B9T (-) required 2-5 micrograms of thymine/ml for aerobic growth on minimal agar and failed to utilize thymidine as a sole source of carbon. The inability to utilize thymidine indicated the presence of mutations in the genetic regions controlling the production of thymidylate synthetase (thy A) and the catabolism of deoxyribonucleosides. Thymine, thymidine, and thymidylic acid supported growth on agar medium of all thymine-requiring mutants studied. Other nucleic acid bases, nucleosides, nucleotides, thymine analogues, orotic acid, deoxyuridine-5'-monophosphate, and other compounds failed to support growth when added to minimal agar lacking thymine. Increased carbon dioxide tension (5 percent) supported colony-formation of E. coli Y meIT (-) and E. coli B27T (-) but not of E. coli B9T (-) on minimal agar lacking thymine. The data were consistent with a hypothesis that E. coli B27T (-) possessed an alternate pathway, independent of thymidylate synthetase, for the biosynthesis of thymidine. Mutants E. coli Y meIT (-) and E. coli B9T (-) appeared to be thymine-requiring mutants with characteristics similar to mutants described by other investigators. (Little-Battelle)
W73-08964

SEROLOGICAL AND PHYSIOLOGICAL CHARACTERISTICS OF ANAEROBIC, NONSPOREFORMING, GRAM-NEGATIVE BACILLI,
North Carolina Univ., Chapel Hill.
For primary bibliographic entry see Field 05A.
W73-08965

ELECTRON MICROSCOPY OF FREEZE--ETCHED PREPARATIONS OF KLEBSIELLA PNEUMONIAE,
Georgia Univ., Athens.
For primary bibliographic entry see Field 05A.
W73-08966

THE ISOLATION AND CHARACTERIZATION OF A HITHERTO UNDESCRIBED GRAM-NEGATIVE BACTERIUM,
North Texas State Univ., Denton.
For primary bibliographic entry see Field 05A.
W73-08968

THE ABNORMAL MORPHOGENESIS OF ARTHROBACTER MARINUS UNDER HEAVY METAL STRESS,
New Hampshire Univ., Durham.
E. R. Gonye, Jr.
Available from Univ. Microfilms, Inc., Ann Arbor, Mich. 48106 Order No. 73-4358. Ph D Dissertation, 1972. 173 p.

Descriptors: *Toxicity, *Nickel, *Cultures, Watr pollution effects, *Heavy metals.
Identifiers: *Arthrobacter marinus, *Megalomophosis, Nickel chloride, Electron microscopy, Culture media, Sample preparation, Freeze etching.

Arthrobacter marinus exhibits alteration of its normal cocooid-rod morphogenesis in the presence of heavy metal ions. Ni caused the most dramatic alterations of cellular morphology at a concentration of 0.0002 to 0.0004 M Ni Cl2 in a basal medium. Under Ni stress the cell enlarged from a normal 1-2 to over 25 millimicron in diameter. In comparison to bacterial cultures of a non-marine origin related to the genus Arthrobacter, A. marinus demonstrated tolerance to the highest concentrations of Ni (0.0005 M) in Nutrient Agar. Only A. marinus formed megalomorphic cells in the presence of NiCl2 concentrations approaching toxicity. In the Ni-stressed condition a loss of cell envelope amino acids including alanine, glutamic acid and diaminopimelic acid was observed. Ferrichrome, Putrescine, and Spermidine were ineffective in sparing megalomorphic formation of A. marinus under Ni stress. Scanning electron microscopy by the freeze-etching technique indicated multivacuolation characterized by vacuole membranes, polybetahydroxybutyric acid granules, and a loss of cell envelope protein granules under Ni stress. An ecological survey of three seawater environments, open ocean, coastal, and estuarine, indicated the open ocean heterotrophic microbial population as the most Ni tolerant. (Little-Battelle)
W73-08969

LEUCOTHRIX MUCOR AS AN ALGAL EPIPHYTE IN THE MARINE ENVIRONMENT,
Indiana Univ., Bloomington.
For primary bibliographic entry see Field 05A.
W73-08970

INITIAL RESPONSES OF PHYTOPLANKTON AND RELATED FACTORS IN LAKE SAMMAMISH FOLLOWING NUTRIENT DIVERSION,
Washington Univ., Seattle.
R. M. Emery.
Available from Univ. Microfilms, Inc., Ann Arbor, Mich. 48106, Order No. 72-28594. Ph D Dissertation, 1972. 244 p.

Descriptors: *Trophic level, *Nutrients, *Phytoplankton, *Primary productivity, *Biomass, Water pollution effects, Phosphorus, Nitrogen, Lakes, Sewage, Urban runoff, Carbon, *Washington.
Identifiers: *Lake Sammamish (Wash), *Sewage diversion, Restoration, Lake Washington, Silicon.

A two-year study on Lake Sammamish was carried out to evaluate the responses of phytoplankton and related factors to a sewage diversion project completed in September, 1968. Trophic indices of pre-diversion years were compared to those in nearby Lake Washington to determine the relative extent of eutrophication. Post-diversion trophic indices were compared to those of pre-diversion years to determine the extent of recovery. In addition, post-diversion changes of indices were compared to those in Lake Washington, a lake with an established pattern of response to diversion. This study shows that, so far, only minor changes which suggest recovery have occurred in Lake Sammamish since diversion. This lack of early response is not consistent with the predicted recovery time of 2.8 year, calculated using a lake restoration model. Concentrations of P and N in Lake Sammamish have not changed significantly since 1968, with one exception. Seasonal levels of phytoplankton production and biomass have not decreased significantly since nutrient diversion, although there was a noticeable change in the composition of phytoplankton populations. Statistical multivariate analyses indicate that Si and C, rather than P and N, have the most influence on algal activity. Results indicate that urban runoff was not a significant source of nutrient enrichment. (Little-Battelle)
W73-08973

DISTRIBUTION OF ICHTHYOPLANKTON IN THE WARM WATER DISCHARGE ZONE OF THE NOVOROSSIISK THERMAL ELECTRIC POWER PLANT, (IN RUSSIAN),
Rostov-on-Don State Univ. (USSR).
L. P. Kostyuchenko.
Vopr Ikhtiol. Vol 11 No 6, p 987-992. 1971 Illus.
Identifiers: Discharge zone, Distribution, Electric powerplants, *Ichthyo plankton, *Novorossiisk Bay (USSR), Plankton, *Thermal pollution, USSR, Warm water.

Information is given on the distribution of eggs and larvae of fishes in the warm water zone of Novorossiisk bay formed by the local power plant. The species composition and quantitative development of ichthyoplankton are analyzed in individual areas of the investigated region as the distance increases from the origin of discharge of warm waters. Data on the change of the spawning time of certain species of fishes as a function of temperature are given. A comparative characterization of ichthyoplankton is presented.--Copyright 1972, Biological Abstracts, Inc.
W73-09018

STUDIES ON SOME EGYPTIAN FRESHWATER ISOLATES OF UNICELLULAR GREEN ALGAE,
Ain Shams Univ., Cairo (Egypt). Dept. of Botany.
For primary bibliographic entry see Field 05A.
W73-09020

RARE CASE OF POISONING BY WATER POLLUTED WITH TOXIC AGRICULTURAL CHEMICALS, (IN RUSSIAN),
Khorezmskii Pedagogicheskii Institut, Urgench (USSR).
B. Kh. Khasanov.
Gig Sanit. Vol 36 No 9, p 96. 1971.
Identifiers: *Agricultural chemicals, *Arsenic, Poisoning, Polluted water, Toxicity, Water pollution effects.

The case history of As poisoning of several farm workers who drank water from a well dug at the site where a storehouse for agricultural chemicals had stood 15 yr before is presented. Excavation around the well revealed 2 corroded drums at a distance of 3.5 m from the well at a depth of 90 cm. The drums contained sodium arsenate which had percolated into the well water.--Copyright 1972, Biological Abstracts, Inc.
W73-09026

HYGIENIC EVALUATION OF NEW POLYMERS USED IN THE DRINKING WATER SUPPLY SYSTEMS, (IN RUSSIAN),
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gigieni i Toksikologii Pestitsidov, Kiev (USSR).
Z. M. Tsam.
Gig Sanit. Vol 36 No 9, p 100-101. 1971.
Identifiers: Hygienic studies, *Polymers, Toxicity, *Potable water, Water supply, Organoleptic properties.

Data are given on the effect of certain polymer materials used in drinking water supply systems on the toxic, physicochemical, organoleptic and quality of the water.--Copyright 1972, Biological Abstracts, Inc.
W73-09027

POLLUTION OF DRINKING WATER AND INFECTIONS BY PSEUDOMONAS AERUGINOSA IN A PEDIATRIC SECTION,
Siena Univ. (Italy). Istituto di Clinica Pediatria.
C. Panero, A. Grasso, C. LaCauza, F. Ragazzini, and G. Bosco.
G Batteriol Virol Immunol Ann Osp Maria Vittoria Torino. Vol 63, No 9/10, p 517-527, 1970.
Identifiers: Infections, *Italy, Nate, Pediatrics, Pollution, *Pseudomonas-aeruginosa, Siena, Water pollution effects, *Potable water.

Because of possible serious infections or its resistance to numerous antibiotics, P. aeruginosa plays an important role during the first year of human life and especially in immature neonates. To prevent infection, efficient prophylaxis including scrupulous disinfection, systematic bacterial control and location of contact areas are important. A series of pediatric cases involving P. aeruginosa in Siena may have been caused by a contaminated drinking water reservoir.--Copyright 1972, Biological Abstracts, Inc.
W73-09035

HYGIENIC PROBLEMS ARISING DUE TO DISCHARGE OF WASTE WATERS OF WOODWORKING PLANTS INTO OPEN WATERS, (IN RUSSIAN),
Institutul de Medicina si Farmacia, Iasi (Rumania).
G. Zamfir, S. Apostol, M. Filipyuk, L. Akeksa, and K. Melinte.
Gig Sanit. Vol 36, No 9, p 91-92, 1971. Illus.
Identifiers: Discharge, *Hygienic studies, Rivers, Toxicity, Treatment, Waste waters, *Woodworking industry, Water treatment.

Analysis of the content of rivers serving as receivers of waste waters of woodworking plants and experimental investigations indicate the complex composition, difficulty of decomposition and high toxicity of cellulose waste. The adverse and long effect on water quality in rivers necessitates an increase of the capacity of treatment plants and of their effectiveness for treating the waste waters.--Copyright 1972, Biological Abstracts, Inc.
W73-09036

SOME INFORMATION ON THE CONTAMINATION OF THE VOLGOGRAD WATER RESERVOIR WITH EGGS OF DIPHYLLOBOTHRIUM LATUM, (IN RUSSIAN),
Institute of Medical Parasitology and Tropical Medicine, Moscow (USSR).
A. S. Artamoshin.
Med Parazitol Parazit Bolezn. Vol 41, No 1, p 87-90, 1972. English summary.
Identifiers: Contamination, Diphyllobothrium-latum, eggs, Fish, Infestation, Reservoir, USSR, *Volgograd reservoir, Water pollution effects, *Helminth.

The significance of the contamination of a water body with eggs of D. latum is discussed. Diphyllobothrial invasion was determined on the basis of catching sites and the extent of infestation of fry of some fish with plerocercoids of this helminth.--Copyright 1972, Biological Abstracts, Inc.
W73-09037

HETEROTROPHIC ASSAYS IN THE DETECTION OF WATER MASSES AT LAKE TAHOE, CALIFORNIA,
California Univ., Davis. Dept. of Zoology; and California Univ., Davis. Inst. of Ecology.
H. W. Paerl, and C. R. Goldman.
Limnol Oceanogr. Vol 17, No 1, p 145-148. 1972. Illus.
Identifiers: Assays, Bacterial studies, California, Cells, *Heterotrophis, Lakes, *Lake Tahoe (Calif), Autoradiographs.

A sensitive biological method for water mass detection was successfully tested in the extremely oligotrophic waters of Lake Tahoe, California. A trace amount of 14C dissolved acetate is added to water samples and microbial incorporation monitored; assimilation rates demonstrate the presence of water masses originating from stream outflow. The same technique also shows microbial stimulation of Tahoe water when stream water is added in culture experiments. Autoradiographs indicate that bacterial cells, sometimes associated with detrital matter, are responsible for the acetate uptake.--Copyright 1972, Biological Abstracts, Inc.
W73-09059

STUDIES ON FRESHWATER BACTERIA: ASSOCIATION WITH ALGAE AND ALKALINE PHOSPHATASE ACTIVITY,
Freshwater Biological Association, Windermere (England).
J. G. Jones.
J Ecol. Vol 60, No 1, p 59-75. 1972. Illus.
Identifiers: *Algae, Alkaline, *Bacteria, Biomass, Diatoms, Dinoflagellates, *Phosphatase activity.

A survey of Windermere North and South Basins and Esthwaite Water at 2 sites at the south end of the lake was made in an attempt to establish the degree of association between the phytoplankton and the bacteria. Positive correlations were established, when all samples were considered, between chlorophyll alpha estimates and bacterial counts. This association varied with the species involved and the degree of attachment by bacteria was seen to diminsih along the series colonial green and blue-green algae > filamentous green and blue-green algae > diatoms > dinoflagellates. This trend was observed when using 'viable' as well as direct counting methods. An increase in the degree of attachment to moribund algal cells when compared with healthy cells was also noted. The positive correlation of bacterial estimates ('viable' and direct counts) with water temperature was observed when all samples were included in the analysis. Alkaline phosphatase activity of paper-filtered samples correlated positively with both algal and bacterial numbers; activity of membrane-filtered samples was significantly correlated only with numbers of phosphatase-producing bacteria. Further examination is required before the origin and control of the enzymes can be established. Estimates of algal and bacterial biomass were made in an attempt to determine their respective roles in the CO2 balance of the lakes. It was noted that indirect estimates of bacterial CO2 evolution were considerably lower than similar estimates of the net uptake of the algal biomass.--Copyright 1972, Biological Abstracts, Inc.
W73-09061

TOLERANCE OF JUVENILE SOCKEY SALMON AND ZOOPLANKTON TO THE SELECTIVE SQUAWFISH TOXICANT 1, 1' -METHYLENEDI-2-NAPHTHOL,
International Pacific Salmon Fisheries Commission, New Westminister (British Columbia).
J. M. Johnston.
Prog Fish-Cult. Vol 34, No 3, p 122-125. 1972.
Identifiers: Costia, Diet, Fishery, Juvenile, Methylene-D1-2, Naphthol, Oncorhynchus-Nerka, Plankton, Ptychocheilul-Oregonensis, *Salmon (Sockeye), Squawfish toxicant, Tolerance, Toxicants, Zooplankton.

The selective squawfish toxicant, 1, 1' - methylenedi-2-naphthol, (Squoxin) was tested for its toxicity to 2 races of juvenile sockeye salmon (Oncorhynchus nerka) at various stages of development, and to 10 spp. of zooplankton occurring in their diet. Static 96-hr bioassays were used to determine the highest concentration of Squoxin that was lethal to 0% of the sockeye (LC0) and compared with the lowest concentration that was lethal to 100% (LC100) of northern squawfish (Ptychocheilus oregonensis). The maximum LC0 values for sockeye depended mainly on their stage of development, ranging from 0.09 to 0.10 ppm for alevins with yolk, to as high as 0.90 ppm for fry and fingerlings. Temperatures between 4.4 degrees and 12.8 degrees C. had little influence on sockeye tolerance to Squoxin, but infection with the protozoan Costia reduced the LC0 of fingerlings to 0.30 ppm. No differences werenoted between the 2 races of sockeye studied. The minimim LC100 for northern squawfish varied with temperature, decreasing from 0.10 ppm at 4.4 degrees C to 0.01 ppm at 12.8 degrees C. Comparison of the 2 spp. indicated that newly hatched sockeye alevins would be subjected to lethal concentrations of Squoxin if squawfish eradication were attempted at temperatures of 4.4 degrees C or less. After yolk absorption, sockeye could tolerate 3 to 90 times the Squoxin concentration lethal to squawfish. No mortalities occurred among the zooplankton tested in static bioassays for 7 days at 12.8 degrees C, even at concentrations of Squoxin 10 times greater than needed to kill northern squawfish at the same temperature.--Copyright 1973, Biological Abstracts, Inc.
W73-09062

COMPARATIVE STUDIES OF PLANT GROWTH AND DISTRIBUTION IN RELATION TO WATERLOGGING: VI. THE EFFECT OF MANGANESE ON THE GROWTH OF DUNE AND DUNE SLACK PLANTS,
Trent Univ., Peterborough (Ontario). Dept. of Biology.
For primary bibliographic entry see Field 02I.
W73-09064

THE ECOLOGY OF MORECAMBE BAY: I. INTRODUCTION,
Freshwater Biological Association, Ambleside (England).
For primary bibliographic entry see Field 02L.
W73-09065

DDT INTOXICATION IN RAINBOW TROUT AS AFFECTED BY DIELDRIN,
Bureau of Sport Fisheries and Wildlife, Columbia, Mo. Fish-Pesticide Research Lab.
F. L. Mayer, Jr., J. C. Street, and J. M. Neuhold.
Toxicol Appl Pharmacol. Vol 22, No 3, p 347-354. 1972. Illus.
Identifiers: Adipose, Brain, *DDT, *Dieldrin, Intoxication, Mortality, *Rainbow trout, Tissue, Trout, Water pollution effects.

Rainbow trout were dosed orally with 5 mg DDT alone and in combination with 0.04 mg or 0.20 mg dieldrin on alternate days, 4 treatments in all. Fish were also pretreated on 4 alternate days with 0.20 mg dieldrin/dose followed by 4 alternate day treatments of 5 mg DDT/dose. The presence of dieldrin caused reduced mortality from DDT intoxication. The time until death after demonstrating signs of intoxication was also much longer in fish receiving dieldrin in addition to DDT than in those receiving DDT only. DDT increased with time in adipose tissue, but the lethal brain levels of DDT were nearly constant. Rainbow trout die at a much lower brain level of DDT than reported for rats or birds.--Copyright 1972, Biological Abstracts, Inc.
W73-09072

RETENTION OF 14C-DDT IN CELLULAR FRACTIONS OF VERTEBRATE INSECTICIDE-RESISTANT AND SUSCEPTIBLE FISH,
Middle Tennessee State Univ., Murfreesboro. Dept. of Biology.
M. R. Wells, and J. D. Yarbrough.
Toxicol Appl Pharmocol. Vol 22, No 3, p 409-414. 1972.
Identifiers: *Carbon-14, Cellular, *DDT, Fish, Gambusia-Affinis, Insecticides, *Mosquito-fish, Vertebrates, Water pollution effects.

DDT resistant and susceptible populations of mosquitofish (Gambusia affinis) were assayed for DDT retention in particulate fractions of livers and brains following in vivo and in vitro treatment with 14C-DDT. Livers and brains were homogenized, and particulate fractions were prepared by differential centrifugation and counted for radio-activity. The in vivo studies indicate a significant difference in retention between brains from susceptible and resistant fish and point to a membrane barrier to DDT in tissues from resistant fish. There is a more effective bloodbrain barrier in resistant fish than in susceptible fish. There was a difference in total distribution of DDT based on percent retention in brain tissue of resistant and susceptible fish. The cell membranes of resistant fish retain DDT, thus reducing the amount entering the cell. The opposite effect is seen in the mitochondrial membrane as DDT is apparently prevented from entering rather than being membrane bound. In the in vivo liver treatments the heavy microsome fraction was the only significantly different cell component in which the heavy microsomes from resistant fish retained more 14C-DDT than those from susceptible fish. For the in vitro treatments all liver fractions from susceptible fish showed a significantly greater retention than did those from resistant fish.--Copyright 1972, Biological Abstracts, Inc.

W73-09073

5D. Waste Treatment Processes

OZONE TREATMENT OF WASTE EFFLUENT,
Idaho Univ., Moscow. Water Resources Research Inst.
R. R. Furgason.
Available from the National Technical Information Service as PB-220 008, $3.00 in paper copy, $1.45 in microfiche. Completion Report, April 1973, 14 p, 5 fig, 1 tab, 5 ref. OWRR A-037-IDA (1) 14-01-001-3212.

Descriptors: *Waste water treatment, *Ozones, Oxidation, *Pulp wastes, *Idaho, Odor, Color, Biodegradation, Waste treatment, Water treatment, Chemical oxygen demand, Sulfates, Iron, Manganese.
Identifiers: Ozonation, Sulfate liquor treatment, Moscow (Ida).

A portable ozone test unit was designed and built for use in treating liquid materials with ozone. Due to its powerful oxidation properties, ozone has a great deal of potential as a treatment system for liquid waste materials and water supplies. The portable test unit was constructed so that it could easily be transported to a field site for testing. Several applications used the ozone test unit. The dark brown, odorous waste effluent from a kraft pulp mill could be satisfactorily decolorized and deodorized by the ozone. In addition, the material after ozonation was more biodegradable than before ozonation. The ozone test unit was also used to treat potable water supplies to remove iron and manganese and to reduce off-odors and off-tastes. Tests run on the Moscow, Idaho, water supply demonstrated that ozone could effectively remove high concentrations of both iron and manganese (1 - 5 mg/l Fe and 0.1 - 1 mg/l Mg).
W73-08455

INVESTIGATION OF FACTORS RELATIVE TO GROUNDWATER RECHARGE IN IDAHO,
Idaho Univ., Moscow. Dept. of Hydrology.
R. E. Williams, A. T. Wallace, D. Eier, D. Wallace, and O. Shadid.
Available from the National Technical Information Service as PB-220 009, $3.00 in paper copy, $1.45 in microfiche. Idaho Water Resources Research Institute, Moscow, Completion Report, June 1972. 140 p, 14 fig, 26 ref, 6 append. OWRR A-028-IDA (1), 14-01-001-3212.

Descriptors: *Groundwater movement, *Idaho, Canneries, Sweet corn, *Recharge, Mathematical models, Soil chemical properties, *Water reuse, *Waste water disposal.
Identifiers: Camas Prairie (Idaho), Buhl (Idaho).

This study examined hydrogeologic environments as related to groundwater flow systems, recharge and the reuse of waste waters. Parameters utilized to delineate areas most suitable for waste water reuse include thickness of unconsolidated material, thickness of unsaturated material, regional slope and whether or not the land is being irrigated and farmed. This project has consisted of four parts: (1) An evaluation and application of methods for delineating large areas which can be safely utilized for the terrestrial disposal of waste water; (2) An examination of chemical changes in soil properties resulting from the application of waste water, particularly sweet corn canning process effluent; (3) An investigation of flow system in a mountain valley, including the application of a mathematical model to the groundwater flow system in order to evaluate its contribution to the hydrologic budget of the valley; and (4) Investigation of the effect of a terrestrial disposal operation on soil water and groundwater in the vicinity of a sweet corn canning operation near Buhl, Idaho. (Trihey-Idaho)
W73-08456

USE OF WATER SOFTENING SLUDGE IN SEWAGE TREATMENT,
Kansas Univ., Lawrence. Dept. of Civil Engineering.
W. J. O'Brien, and J. A. Moore.
Available from the National Technical Information Service as PB-220 120, $6.00 paper copy, $1.45 in microfiche. Kansas Water Resources Institute, Manhattan, Contribution No. 108, December 1972, 183 p, 28 fig, 43 tab, 12 append. OWRR A-031-KAN (1), 14-31-0001-3016.

Descriptors: *Waste water treatment, Lime, Sludge, Suspended solids, Costs, *Kansas, Water quality, *Sewage treatment, Economics, *Water softening, Biochemical oxygen demand, Chemical oxygen demand.
Identifiers: *Lime softening sludge, *Lawrence (Kan).

This investigation was conducted to determine whether sludge produced by the excess lime softening process could be used in sewage purification. The study was performed at the water and waste water treatment plants located in Lawrence, Kansas. The chemical composition of the water softening sludge was approximately 85% CaCO3 and 4% Mg (OH)2. About 600 mg (dry weight) of sludge was available for treating each liter of sewage. The average BOD5 of the raw sewage was 290 mg/l. The total COD was 470 mg/l and the total phosphorous was 11.6 mg/l. These values are greater than those found in typical municipal sewage. The total suspended solids were 188 mg/l. This value is slightly lower than expected. Only 19% of the BOD5 and 46% of the suspended solids were removed by conventional primary sedimentation. The addition of softening sludge to a pilot plant consisting of a mixing basin followed by sedimentation with sludge recycle increased the BOD5 removal to 83%, the suspended solids removal to 81%, and the total phosphorous removal to 45%. The optimum concentration of total suspended solids in the mixing chamber was about 2500 mg/l. The annual cost of capital, labor and supplies, for a 10 MGD activated sludge plant using a solids contact basin for primary treatment and vacuum filtration for sludge dewatering was slightly less than the cost of providing separate sewage treatment and softening sludge disposal facilities for Lawrence. Use of the softening sludge for sewage treatment was very economical if additional phosphorous removal was obtained by use of alum, ferric iron, or ferrous iron.
W73-08457

SLUDGE PRODUCTION AND DISPOSAL FOR SMALL, COLD CLIMATE BIO-TREATMENT PLANTS,
Alaska Univ., College. Inst. of Water Resources.
T. Tilsworth.
Available from the National Technical Information Service as PB-219 980, $3.00 in paper copy, $1.45 in microfiche. Completion Report No IWR-32, December 1972. 43 p, 11 fig, 5 tab, 54 ref, 2 append. OWRR A-033-ALAS (2).

Descriptors: *Freezing, *Refrigeration, *Sludge disposal, Ultimate disposal, Activated sludge, Cost analysis, *Dewatering, *Sludge treatment, Waste water treatment.
Identifiers: Natural refrigeration, Package sewage treatment plants, Extended aeration, Freeze-thaw technique, Sand drying beds.

A sludge disposal process consisting of modified sand drying beds in combination with the freeze-thaw technique utilizing natural refrigeration was evaluated. Special consideration was directed at designing a process that was simple to operate and easy to maintain. The purpose of freeze-thawing of sewage sludge is principally to condition the sludge such that it is readily dewaterable and, subsequently, results in a reduced volume of solids to be further processed. The study consisted of three separate evaluations using three model drying beds for each respective run. Two of the beds were studies at sludge depths of six inches, and the third bed was evaluated at an eighteen-inch sludge depth. Settled activated sludge for placement on the model beds was obtained from the sedimentation tank of a local activated sludge plant. Field evaluations were conducted from February to June, 1971. The use of natural refrigeration for conditioning waste activated sludge by the freeze-thaw method was very effective. Freezing of the sludge substantially improved its settleability and dewatering characteristics. The sludge handling characteristics were greatly improved, the sludge being granular and earthy with little to no odor. Design of a prototype operation should consider two operational phases including summertime conventional sand drying and wintertime lagoon freezing. The depth of the sludge to be frozen is dependent on the local climatology. Estimated costs for the process, based on a depth of twelve inches for freezing, compare favorably with the alternatives available for sludge dewatering. Capital and operating costs are estimated at approximately $50 per ton of sludge processed as compared to $70 per ton using vacuum filtration, centrifugation or incineration and $100+ per ton for sand drying beds.
W73-08603

ENVIRONMENTAL ENGINEERING PROGRAMS QUARTERLY TECHNICAL PROGRESS REPORT JANUARY, FEBRUARY, MARCH 1972.
Hanford Engineering Development Lab., Richland, Wash.
For primary bibliographic entry see Field 05B.
W73-08619

ENVIRONMENTAL ENGINEERING PROGRAMS QUARTERLY TECHNICAL PROGRESS REPORT JULY, AUGUST, SEPTEMBER 1971.
Hanford Engineering Development Lab., Richland, Wash.
For primary bibliographic entry see Field 05B.
W73-08620

FROM PHOSPHATE AND ALGAE TO FISH AND FUN WITH WASTE WATER--LANCASTER, CALIFORNIA,
F. D. Dryden, and G. Stern.
In: Report No 24, June 1969, University of Arizona, Tuscon, 'Water Reclamation by Tertiary Treatment Methods,' p 1-40. 12 fig, 2 tab.

Descriptors: *Water reuse, *Water quality standards, *Recreation demand, *Reclaimed water, *California, Oxidation lagoons, Turbidity, Coagulation, Costs, Simulation analysis, Pilot plants, Laboratory tests, Wastewater treatment, Settling basins, Testing procedures, Filtration, Chlorination.
Identifiers: *Lancaster (Calif.).

The most economical method of renovating waste water for use in recreational lakes was determined and pilot studies conducted. Criteria on turbidity, phosphate concentration, pH value, low concentration of COD and BOD, algal counts, and coliform and virus determinations were established. Basic data on the character of the water to be treated were collected. The most effective coagulants and coagulant aids, their required dosages, and the best flocculating conditions were determined in laboratory studies. Various treatment processes were compared and reasonable costs estimated. A practical tertiary process was developed to supply boating and fishing lakes near Lancaster, California. The process selected and piloted features treatment with alum, sedimentation, filtration, and chlorination. Phosphate and algal counts are consistently reduced. Product water has been evaluated in the laboratory and in large simulated lakes stocked with fish. Algae slowly grow to high concentrations in the water but the rate of biological activity does not deplete

the oxygen supply, interfere with fish life, or cause nuisances. Algal growth rates are inhibited at phosphate concentrations less than 0.5 mg/l and almost stop at less than 0.05 mg/l. The ecology of the simulated lake is typical of an oligotrophic fresh water lake. (Jones-Wisconsin)
W73-08645

EFFECTS OF MUNICIPAL WASTE WATER DISPOSAL ON THE FOREST ECOSYSTEM,
Pennsylvania State Univ., University Park. School of Forest Resources.
W. E. Sopper, and L. T. Kardos.
Pennsylvania Institute for Research on Land and Water Resources Reprint Series No 31, 1972. 6 p, 4 photo, 1 tab, 16 ref. (Reprint from Journal of Forestry, Vol 70, No 9, September 1972.) OWRR B-047-PA (1).

Descriptors: *Waste water disposal, *Sprinkler irrigation, *Irrigation effects, *Forests, *Water reuse, Forest management, Water pollution control, Sewage disposal, Recharge, Municipal wastes, Environmental effects.

Diversion of wastewater to the forest ecosystem should help to eliminate or alleviate many disposal and pollution problems. In some instances it might even provide such secondary benefits as increased recharge of groundwater reservoirs, increased growth of vegetation, and amelioration of barren unproductive sites. Satisfactory renovation of municipal waste water was achieved when the sewage effluent was applied at rates of 1, 2, and 4 inches per week in forested areas during the period April to November. Soil samples analyzed indicated no detrimental effects on the chemical status of the upper 5 feet of soil. Irrigation of red pine with 1 inch sewage effluent per week did not significantly increase diameter growth. Two inches per week was detrimental. Height growth of red pine was increased with 1 inch of effluent and decreased with 2 inches per week. Diameter growth of the mixed hardwood species was not affected by the 1-inch per week application but was significantly increased by 2 and 4 inches per week. Height growth of white spruce saplings was significantly increased by irrigation with sewage effluent at the rate of 2 inches per week. Irrigation caused significant changes in the herbaceous ground cover in the old-field area. Height growth, density, and dry matter production were all significantly increased. About 90% of the waste water applied at 2 inches per week was recharged to the groundwater reservoir. Annual recharge averaged 1.6 million gallons per acre during the April to November irrigation period. (Knapp-USGS)
W73-08731

MICROBIAL RESPONSE IN LOW TEMPERATURE WASTE TREATMENT,
Toronto Univ. (Ontario).
For primary bibliographic entry see Field 05B.
W73-08797

WATER POLLUTION CONTROL, A STATE-OF-THE-ART REVIEW,
Port of New York Authority, N.Y.
D. P. Costa.
In:Actual Specifying Engineer, Vol 24, No 1, 1970. p 1-10. Reprint, BIF, Providence, Rhode Island, January 1971.

Descriptors: *Water pollution control, *Reviews, *Sewage treatment, *Treatment facilities, *Wastewater treatment, Water pollution, Trickling filters, Activated sludge, Water quality control, Domestic wastes, Industrial wastes, Technology.

Waste water treatment facilities, manpower, and funds have not kept pace with water pollution. Water consumption averages about 155 gallons per capita per day and, because of this high consumption, disposal methods that rely on the capacity of the environment to absorb and dilute pollutants are ineffective in urban areas. Pollution from waste water can be reduced by three methods: dilution, treatment, or the creation of less potentially harmful material. Dilution is rarely a feasible solution because waste sources are concentrated and large volumes are present. Treatment plants usually provide primary and/or secondary treatment. Primary treatment consists of mechanical separation to remove the larger, floating, suspended and undissolved particles. Such processes remove only visible pollutants and particulate matter. Reliance on primary treatment alone can result in pollution of the receiving waters. Secondary treatment employs biochemical processes to remove pollution. Bacteria react with the organic matter through absorption, digestion, oxidation, assimilation or decomposition. The processes most commonly used are (1) trickling filter and (2) activated sludge. Trickling filters are stone beds onto which primary treated waters are sprinkled. The seeping water comes into contact with biological growth on the stones and, in the presence of oxygen, receives treatment. Activated sludge accomplishes the same task in a completely wet system, with the primary effluent entering a tank with sludge from a settling basin. The sludge is rich with biological growths and provides treatment to the incoming waters. Schematic sketches are included to illustrate processes. (Poertner)
W73-08900

DESAL ION EXCHANGE FOR DEMINERALIZATION AT SANTEE, CALIFORNIA,
Santee County Water District, Calif.
H. Filar, Jr.
Available from the National Technical Information Service as PB-220 123, $3.00 in paper copy, $1.45 in microfiche. Environmental Protection Agency Report EPA-R2-73-239, May 1973. 117 p, 19 fig, 14 tab, 7 ref, 5 append. EPA Project 17080 EDV. WPRD 5-01-67.

Descriptors: *Ion exchange, *Demineralization, *Desalination, Water purification, *Resins, Anion exchange, Cation exchange, Potable water, Water quality, Tertiary treatment, *California, Cost analysis, Waste water treatment.
Identifiers: *Desal ion exchange process, Santee (Calif).

A 50,000 gpd Desal ion exchange pilot plant for the demineralization of lime treated, dual media filtered, tertiary effluent has been built and tested at Santee, California. The plant removed up to 86 percent of the total dissolved solids (TDS) as CaCo3. Influent TDS ranged from 700 to 1000 mg/l during the two month operating period (All TDS values were the sum of the chloride, sulfate, and alkalinity concentrations as CaCO3). Anion resin (45 cu ft of IRA-68) capacities of 11.4 and 9.7 Kgr (as CaCO3)/cu ft were obtained with a tertiary effluent flow of 1 gal./cu ft/min and an operating pressure of 40 psig. The system was designed to demineralize a portion of the influent stream and blend it with influent water to make a product TDS equal to or better than the Colorado River drinking water supplied to Santee. Because of the short operating time, emphasis was placed on the demineralization process, especially the anion IRA-68 resin performance. The estimated total cost, based on Santee, for 64,370 gpd of 500 mg/l (as CaCO3) blended effluent is $1.00 per 1000 gallons. This estimate calls for activated carbon adsorption influent, two complete operating cycles per day, and a properly functioning blending system. (See also W73-08976) (EPA)
W73-08975

CARBON ADSORPTION AND ELECTRODIALYSIS FOR DEMINERALIZATION AT SANTEE, CALIFORNIA,
Santee County Water District, Calif.
H. Filar, Jr.
Available from the National Technical Information Service as PB-220 360, $6.00 in paper copy, $1.45 in microfiche. Environmental Protection Agency, Report EPA-R2-73-240, May 1973. 437 p, 37 fig, 34 tab, 20 ref, 5 append. EPA Project 17040 FKG. 14-12-444.

Descriptors: *Demineralization, *Desalination, *Electrodialysis, *Activated carbon, Carbon, Membranes, Membrane process, Dissolved solids, Pilot plants, Filtration, Fouling, Reclaimed water, Potable water, Tertiary treatment, *California, Cost analysis, Waste water treatment.
Identifiers: Santee (Calif), Salt removal, *Carbon adsorption.

A 100,000 gpd activated carbon adsorption pilot plant followed by a 50,000 gpd electrodialysis pilot plant for the demineralization of lime treated tertiary effluent, has been built and tested at Santee, California. The average total chemical oxygen demand (COD) removal, by the entire carbon column, was 57 percent with an average 30.9 mg/l influent and an average 13.4 mg/l effluent concentration. The average dissolved COD removal was 58 percent with an average 26.9 mg/l influent and an average 11.4 mg/l effluent concentration. The cost of the 100,000 gpd activated carbon plant, including the replacement of expended carbon with virgin activated carbon, was 35.9 cents per 1000 gallons of product. The electrodialysis pilot plant produced water near the Federal Public Health Service Drinking Water Standards. Typical operation on clean membranes was 60 percent removal of the total dissolved solids with an 1135 mg/l influent and a 455 mg/l effluent concentration. Sulfuric acid flushes, enzymatic detergent flushes, and plant shutdowns were effective in retarding the organic (fouling) and inorganic (scaling) buildups on the membrane surfaces. An estimate for a 1.5 MGD electrodialysis plant, excluding brine disposal costs, is 28.6 cents per 1000 gallons of product. (See also W73-08975) (EPA)
W73-08976

FINAL ENVIRONMENTAL STATEMENT RELATED TO OPERATION OF CALVERT CLIFFS NUCLEAR POWER PLANT UNITS 1 AND 2.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 05B.
W73-08993

FINAL ENVIRONMENTAL STATEMENT FOR THE EDWIN I. HATCH NUCLEAR PLANT UNITS 1 AND 2.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 05B.
W73-08994

FINAL ENVIRONMENTAL STATEMENT RELATED TO OPERATION OF SHOREHAM NUCLEAR POWER STATION.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 05B.
W73-08995

FINAL ENVIRONMENTAL STATEMENT RELATED TO OPERATION OF THREE MILE ISLAND NUCLEAR STATION UNITS 1 AND 2.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 05B.
W73-08996

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE LA SALLE COUNTY NUCLEAR STATION.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 05B.

W73-08997

TREATMENT EFFICIENCY OF WASTE STABILIZATION PONDS,
South Dakota School of Mines and Technology, Rapid City.
K. A. Mangelson, and G. Z. Watters.
Journal of the Sanitary Engineering Division, American Society of Civil Engineers, Vol 98, No SA 2, Proc. Paper 8849, p 407-425, April 1972. 14 fig, 4 tab, 13 ref, append. OWRR A-008 Utah (1). 14-31-0001-3545.

Descriptors: *Dispersions, Hydraulics, *Time of concentration, *Tracers, Baffles, Hydraulic models, *Oxidation lagoons, *Waste water treatment.

A practical method is given for evaluating the influence of the hydraulics on waste water pond performance. The analysis is based on time-concentration data collected at the outlet for tracer tests performed on prototype ponds and on a hydraulic model. Time-concentration data were collected for many pond designs to evaluate the importance of depth distortion, Reynolds Number, inlets and outlets, length to width ratios, and baffling. These data were then coupled with the first order reaction equation to determine the expected treatment efficiency for the different pond designs.
W73-09001

OPTIMAL FAIL-SAFE PROCESS DESIGN,
Louis Koenig--Research, San Antonio, Tex.
L. Koenig.
Journal Water Pollution Control Federation, Vol 45, No 4, p 647-654, April, 1973. 3 fig, 3 ref.

Descriptors: *Waste water treatment, *Design, Equipment, *Safety, *Optimization, *Computer programs, *Costs, Size, Engineering, Economics, Operations research, Mathematical models.
Identifiers: Capacity, *Process plants, Firm capability, Treatment plants.

In preliminary design and cost estimation for waste water treatment plants curves relating cost to capacity are often used. Such curves have limitations since they do not account for available sizes of units, upper and lower bounds on unit sizes, or inclusion of excess capacity for outages. Costs tend to be proportional to the 0.7 power of size between the upper and lower limiting unit sizes, to the 0.95 power for multiples of the maximum unit size, and constant at the cost of the smallest unit for capacities smaller than that unit. A computer program developed to find the least-cost size and number of equal-size units to achieve fail-safe design is presented. This optimum is usually found at or near the minimum number of units (largest unit size) that satisfies the needed design capacity. (Bell-Cornell)
W73-09006

ANALYSIS AND OPTIMIZATION OF TWO--STATE DIGESTION,
Kansas State Univ., Manhattan. Dept. of Chemical Engineering.
L. T. Fan, L. E. Erickson, J. C. Baltes, and P. S. Shah.
Journal Water Pollution Control Federation, Vol 45, No 4, p 591-610, April, 1973. 11 fig, 77 equ, 28 ref.

Descriptors: *Anaerobic digestion, *Design, *Optimization, *Waste water treatment, Wastes, *Biological treatment, Costs, Kinetics, Simulation analysis, Systems engineering, Operations research, Mathematical models.
Identifiers: *Anaerobic contact process, Two-stage digestion, Steady state analysis, Washout analysis, Recycle ratio, Economic analysis, Anaerobic processes.

A mathematical formulation employing the kinetic model of Willimon and Andrews is used to simulate conventional and contact anaerobic digestion processes consisting of two stages. Presented is a system of two completely mixed digesters in which the process is carried out without recycle (conventional) and with recycle (contact). Performance equations of the system are developed by means of mass balance. A unified analysis of the steady states of the system is made because of the possible existence of multiple steady states. Two specific steady-state operations--normal steady-state and washout steady-state--are considered in detail. The critical flow rates that cause washout of some or all species are investigated. To further clarify the results of the steady-state and washout analyses, numerical simulations are carried out. Finally, the optimal design policy for a two-stage continuous anaerobic digester system is determined by joining an economic model to the process model. The optimization problem is nonlinear and is performed using the simplex search technique. Optimization is carried out by constructing an economic objective function and the optimal first- and second-stage mean holding times are obtained. Increases in recycle ratio decrease treatment cost and improve efficiency in an optimum system. (Bell-Cornell)
W73-09007

NEW TECHNIQUES IN WATER POLLUTION CONTROL,
House, Washington, D.C.
For primary bibliographic entry see Field 06E.
W73-09014

AEROSPACE VEHICLE WATER-WASTE MANAGEMENT,
National Aeronautics and Space Administration, Washington, D.C.
For primary bibliographic entry see Field 05G.
W73-09017

5E. Ultimate Disposal of Wastes

BENTHAL OXYGEN DEMANDS AND LEACHING RATES OF TREATED SLUDGES,
Manhattan Coll., Bronx, N.Y.
For primary bibliographic entry see Field 05C.
W73-08527

SLUDGE PRODUCTION AND DISPOSAL FOR SMALL, COLD CLIMATE BIO-TREATMENT PLANTS,
Alaska Univ., College. Inst. of Water Resources.
For primary bibliographic entry see Field 05D.
W73-08603

5F. Water Treatment and Quality Alteration

OZONE TREATMENT OF WASTE EFFLUENT,
Idaho Univ., Moscow. Water Resources Research Inst.
For primary bibliographic entry see Field 05D.
W73-08455

USE OF WATER SOFTENING SLUDGE IN SEWAGE TREATMENT,
Kansas Univ., Lawrence. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05D.
W73-08457

PUBLIC WATER SUPPLY SYSTEMS RULES AND REGULATIONS.
Illinois State Dept. of Health, Springfield. Div. of Sanitary Engineering.
For primary bibliographic entry see Field 06E.

W73-08893

PRESENT DAY ENGINEERING CONSIDERATIONS AS APPLIED TO WATER LINE DESIGN,
Woolpert (Ralph L.) Co., Dayton, Ohio.
For primary bibliographic entry see Field 08A.
W73-08896

HYGIENIC EVALUATION OF NEW POLYMERS USED IN THE DRINKING WATER SUPPLY SYSTEMS, (IN RUSSIAN),
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gigieni i Toksikologii Pestitsidov, Kiev (USSR).
For primary bibliographic entry see Field 05C.
W73-09027

POLLUTION OF DRINKING WATER AND INFECTIONS BY PSEUDOMONAS AERUGINOSA IN A PEDIATRIC SECTION,
Siena Univ. (Italy). Istituto di Clinica Pediatria.
For primary bibliographic entry see Field 05C.
W73-09035

HYGIENIC PROBLEMS ARISING DUE TO DISCHARGE OF WASTE WATERS OF WOOD-WORKING PLANTS INTO OPEN WATERS, (IN RUSSIAN),
Institutul de Medicina si Farmacia, Iasi (Rumania).
For primary bibliographic entry see Field 05C.
W73-09036

5G. Water Quality Control

AN EXAMINATION OF THE ECONOMIC IMPACT OF POLLUTION CONTROL UPON GEORGIA'S WATER-USING INDUSTRIES,
Georgia Inst. of Tech., Atlanta. Engineering Experiment Station.
W. G. Dodson, and R. B. Cassell.
Available from the National Technical Information Service as PB-220 006, $3.00 in paper copy, $1.45 in microfiche. Georgia Environmental Resources Center Report No. ERC-0173, February 1973, 43 p, 8 tab, 114 ref, 5 append. OWRR B-064-GA (1).

Descriptors: *Industrial wastes, Food processing industry, Pulp and paper industry, Textile industry, Kaolin industry, Electric power industry, Institutions, *Water quality standards, *Georgia, *Attitudes, *Economic impact, Administrative agencies.
Identifiers: *Water quality management.

The study used interviews of management personnel in 28 companies and of state and Federal water pollution control officials to assess the economic impact of existing water pollution control programs upon Georgia's large water-using industries including pulp and paper manufacturing, textiles, food processing, kaolin mining and processing, and electric power generation. The goals were to evaluate industry acceptance of and support for water pollution control programs to propose methods for improving such acceptance. The interviews revealed extensive voluntary cooperation between government and industry in addressing pollution problems. Companies believed the basic legislation to be fair even though they reported profit losses, but they perceived a failure of officials to consider differing waste characteristics and were concerned by pressures by environmentalists to legislate unrealistic standards. Officials were concerned over the lack of available information for them to use in assessing the economic impact of alternative control policies. Community leaders were unaware of the effects of pollution control programs on the ability of a community to attract industry. Many companies have difficulty in passing pollution control costs on to the consumer, and small businesses particularly need technical and financial help. More effective com-

munications channels between enforcement officials and industry are also important and should be used to develop improved predictions of the effects of water quality management programs on local economies. (James-Georgia)
W73-08453

STREAM POLLUTION FROM CATTLE BARN-LOT (FEEDLOT) RUNOFF,
Ohio State Univ., Columbus. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 05B.
W73-08459

EFFECTS OF LONG CHAIN POLYMERS ON THE SIZE DISTRIBUTION OF OIL-IN-WATER EMULSIONS,
Brown Univ., Providence, R.I.
R. I. Tanner, and R. W. Fisk.
Available from the National Technical Information Service as PB-220 011, $3.00 in paper copy, $1.45 in microfiche. R. I. Water Resources Center Completion Report, (1973). 13 p, 7 fig, 1 ref. OWRR A-043-RI (2).

Descriptors: *Polymers, *Emulsions, *Oil-water interfaces, *Particle size, Water pollution control.
Identifiers: Long chain polymers, *Coulter counter, Polyethylene oxide, Separan, Cetane.

The effects of long chain, turbulent drag reducing polymers on oil-in-water emulsions were studied using the Coulter Counter. Both 50 ppm polyethylene oxide and 500 ppm Separan MGL proved to reduce particle counts while 500 ppm polyethylene oxide had the adverse effect of increasing the density. Solutions of 4.4% polyisobutylene in cetane and 50 ppm Separan MGL had no noticeable effect on the size distribution. The inflection point diameter could not be found in each emulsion. Therefore it was recommended that future testing be continued investigating smaller particles through the use of a smaller (30 micro) aperture tube.
W73-08460

USE OF ADVANCED WATER RESOURCES PLANNING TECHNIQUES IN THE DEVELOPMENT OF REGIONAL WATER QUALITY MANAGEMENT PROGRAMS,
Clemson Univ., S.C. Dept. of Environmental Systems Engineering.
B. C. Dysart, III.
Available from the National Technical Information Service as PB-220 121, $9.00 in paper copy, $1.45 in microfiche. Report No. 34, South Carolina Water Resources Research Institute, Clemson, S.C. December 1972. 319 p, 62 fig, 19 tab, 57 ref, 5 append. OWRR B-017-SC (8), 14-31-0001-3127.

Descriptors: *Planning, *Water management (Applied), *Water quality control, *Decision making, *Mathematical models, Dynamic programming, Institutinal constraints, Economic efficiency, Hydrologic models, Public opinion, Algal nutrients, Eutrophication, Social aspects, Interbasin water transfers, *South Carolina.
Identifiers: *Greenville (SC), *Reedy River (SC), *Public participation, Alternate management plans, Lake Greenwood (SC).

Results are presented of investigations of water resources planning and management techniques of four types. The first section considered basinwide water quality modeling from a practical viewpoint. Several alternate management policies, e.g., an optimal policy based upon dynamic programming and a uniform treatment policy, were derived for a basin. The economic and water quality ramifications were presented for use by dischargers and regulatory agencies in selecting the best policy. Individual treatment as well as regional plants and multiple outfalls were considered. The second section dealt with nutrient and eutrophication problems in the Reedy River basin and a reservoir. Sources, effects, and possible remedial measures were proposed. The third section presented the development of an improved water yield model and application to the upper Reedy River basin and the Greenville, S.C. area. The utility of the model in describing or predicting effects of interbasin diversions on the hydrology of an area was presented. Such information is necessary for water quality management planning. The model has as inputs 5-day precipitation and produces runoff for 5-day periods. The final section reported on an investigation of public preferences for water quality in the Greenville, S.C. area. The public desired improved water quality and were willing to pay a rather substantial amount to achieve this.
W73-08461

AQUATIC FUNGI OF THE LOTIC ENVIRONMENT AND THEIR ROLE IN STREAM PURIFICATION,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Biology.
For primary bibliographic entry see Field 05C.
W73-08462

HYDRAULIC AND SEDIMENT TRANSPORT STUDIES IN RELATION TO RIVER SEDIMENT CONTROL AND SOLID WASTE POLLUTION AND ECONOMIC USE OF THE BY-PRODUCTS,
Kentucky Water Resources Inst., Lexington.
For primary bibliographic entry see Field 02J.
W73-08468

SOME DESIGNS AND ANALYSES FOR TEMPORALLY INDEPENDENT EXPERIMENTS INVOLVING CORRELATED BIVARIATE RESPONSES,
California Polytechnic State Univ., San Luis Obispo. Dept. of Computer Science and Statistics.
For primary bibliographic entry see Field 04A.
W73-08546

AIR COOLED HEAT EXCHANGERS-NEW GROWTH,
T. C. Elliott.
Power, Vol 115, No 8, p 88-90, August 1971. 3 fig.

Descriptors: *Heat exchangers, *Cooling, *Economics, Environmental effects, Thermal powerplants, Thermal pollution, Electric power demand, Temperature, Corrosion, Common control, Economic justification, Refrigeration.
Identifiers: *Air cooling, Natural draft, Mechanical draft.

Air cooling is discussed from the standpoint of economics and its environmental attractiveness. The biggest disadvantage is cost caused by the outsize system needed to offset the poor heat transfer capabilities of air. Air-cooled heat exchangers cost from 15-37 $/KW (mechanical draft to 25-65 $/KW (Natural draft) as compared to evaporative cooling towers 4-14 $/KW (mechanical draft) or 6-20 $/KW (Natural draft). Because of sensible heat transfer, dry bulb temperature may limit cooling capability. Air-side fouling is negligible, however, when compared to problems of scale and corrosion in water cooling systems. Air is the best choice when the overall heat transfer coefficient is low, process fluid temperatures are high and water usage is costly, especially in the western part of the United States. (Oleszkiewicz-Vanderbilt)
W73-08611

THE FLOURISHING DISTRICT HEATING BUSINESS,
For primary bibliographic entry see Field 06D.
W73-08612

UNDERGROUND NUCLEAR POWER PLANT SITING,
Aerospace Corp., San Bernardino, Calif.
For primary bibliographic entry see Field 06G.
W73-08617

UTILITY BATTLES: YOU CAN'T WIN 'EM ALL.

Electrical World, Vol 176, No 7, p 27-28, Oct 1971. 1 fig.

Descriptors: *Thermal powerplants, *Thermal pollution, *Regulation, *Nuclear powerplants, *Permits, Electric power production, Environmental effects, Legal aspects, Administrative agencies, Control systems, Management, Water policy, Water treatment, Heated water, Judicial decisions.
Identifiers: Atomic Energy Commission.

Strict licensing criteria set up by the Atomic Energy Commission threaten to slow down or suspend construction schedules for some 51 nuclear plants. A test suit between the Interior Department and the Florida Power and Light Company failed to clearly resolve whether heated water could be considered under the 1899 Refuse Act but, FPLC has been required to build 165-185 miles of parallel canals in order to operate under conditions which are not harmful to the environment. A D.C. Appeals Court directive has instructed the AEC to consider the environmental impact when licensing new facilities. This may result in further delays in power plant operation which could have serious consequences for the national power supply. The AEC's only concession was to allow plants whose hearings for operating licenses were already pending to operate at 20% of full power. Concern has been expressed over 11 plants with approximately 7500 Mw potential which are nearing completion. (Jerome-Vanderbilt)
W73-08622

RIVER JET DIFFUSER PLANNED.

Electrical World, Vol 176, No 5, p 25, September 1, 1971. 1 photo.

Descriptors: *Thermal pollution, *Discharge (Water), *Heated water, *Jets, *Regulation, Electric power production, Hydraulic engineering, Effluents, Environmental effects, *Mississippi River, Design specifications, Structural design, Standards, Fish barriers, Temperature, *Illinois.

The plans of Commonwealth Edison Company to build a $6 million multi-jet diffuser in the river bed of the Mississippi River at Cordova, Illinois, are discussed. The proposed system would involve two pipes extending 1,180 ft. across with orifices at 20 ft. intervals. It would discharge 2,270 cu. ft/sec. of effluent and 12 billion B.T.U.'s/hr. of heat into average river flow of 45,000 cu. ft./sec. The high velocity of discharge would mean complete mixing within 40 ft. with a temperature increase of less than 4.3 F. Extensive testing and design studies have been completed, but approval must be obtained from the Environmental Protection Agency and state agencies. Questions have been raised about the true mixing zone distance, a request for temporary exclusion from monthly maximum temperature regulations, and the possibility that the diffuser will present a barrier to fish passage. (Jerome-Vanderbilt)
W73-08631

A SLOW AND PAINFUL PROGRESS TOWARDS MEETING OUR WATER POLLUTION CONTROL GOALS,
For primary bibliographic entry see Field 06E.
W73-08650

QUALITY STANDARD FOR IRRIGATION WATER IN THE TROPICS,
Hawaii Univ., Honolulu. Dept. of Agronomy and Soil Science.
For primary bibliographic entry see Field 03C.
W73-08652

CONCEPTS FOR ANALYSIS OF MASSIVE SPILL ACCIDENT RISK IN MARITIME BULK LIQUID TRANSPORT,
Coast Guard, Washington, D.C. Office of Research and Development.
J. S. Gardenier, II.
Available from the National Technical Information Service as AD-746 035, $3.00 in paper copy, $1.45 in microfiche. June 1972. 55 p, 4 fig, 18 ref.

Descriptors: *Ships, *Liquids, *Transportation, *Accidents, *Risks, Water pollution control, *Probability, Methodology, Systems analysis, Mathematical models, Simulation analysis.
Identifiers: *Accident analysis (Marine), Risk analysis, Vessel safety, Accident data systems, System safety, Massive spill, Tank vessels, Fault tree analysis, Critical paths.

An effort was made to identify concepts, methods, and problems relevant to quantitative and systematic analysis of the risk of major pollution events resulting from tank vessel accidents. Guidance is provided to government or nongovernment project officials in attempting to conduct actual risk analyses. However, the guidance is tentative (pending implementation) and represents the opinions of the author rather than official U.S. Coast Guard policy. The major conclusions are that available methodologies, data, and technologies are insufficient for this problem, thereby requiring significant innovation for successful conduct of an analysis. Among the requirements are: A reorientation in the concept of 'cause' of an accident; definition and estimation of functions to express the energy levels which will rupture tanks under various circumstances; definition and collection of data on accident exposure; understanding and mathematically formalizing interrelated factors in accident risk; postulating alternative corrective actions; and assessing the probable real world effectiveness of each potential corrective action. The difficulty of such analyses is exceeded only by the necessity that they be conducted to support cost effective measures aimed at reducing pollution risk in maritime transportation. (Bell-Cornell)
W73-08654

THE MANAGEMENT OF GROUNDWATER RESOURCE SYSTEMS,
California Univ., Santa Barbara. Dept. of Mechanical Engineering.
J. C. Bruch, Jr., and C. Taylor.
Journal of Environmental Planning and Pollution Control, Vol 1, No 2, p 36-43, Winter 1972/73. 5 fig, 11 ref.

Descriptors: *Groundwater resources, *Management, Groundwater basins, *Water pollution control, Pollutants, Water storage, Water supply, Waste water, Pumping, Drains, Aquifers, Soil water, Wells, Percolation, Groundwater movement, *Simulation analysis, Computer models, Surface-groundwater relationships, Conjunctive use, Irrigation, Drainage, *California, *Recharge.
Identifiers: Coastal areas, Sea water intrusion, Weed-killer, Flow data, Indus River Valley (India), Honolulu aquifer (Hawaii), Oxnard Basin (Cal.).

The groundwater zone is a major natural resource of potable water which, with efficient management and control, can become a major zone of subterranean water storage and supply. It is not sufficient only to investigate the yield and storage potential of a basin: Due attention must be given possible sources of contamination and the resulting concentration of pollutants within the groundwater domain, so that one can formulate control procedures to prevent degradation of both the possible source of potable water and the soil matrix which affects this water. After a brief introduction to groundwater basins, types of groundwater pollutants and how they penetrate the groundwater environment are discussed. Next, five controls for groundwater pollution are described: (1) controls supplied by the natural environment of the basin; (2) controls implemented through logic in knowing the imminent dangers present in the environment; (3) controls eliminating or reducing the pollutant at its source; (4) in situ controls for pollution above the tolerable toxic limit; and (5) computer simulation. Finally, two prototype systems are presented and analyzed in detail, illustrating cases where knowledge of concentration of a pollutant is vital for prevention of groundwater degradation. The Indus Valley and the Oxnard Plain in California are used as case examples. (Bell-Cornell)
W73-08660

CRUDE OIL AND NATURAL GAS PRODUCTION IN NAVIGABLE WATERS ALONG THE TEXAS COAST (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Galveston, Tex.

Available from National Technical Information Service, U.S. Dept. of Commerce as EIS-TX-72-5069-F, $12.50 paper copy, $1.45 microfiche. August 9, 1972. 198 p, 1 plate.

Descriptors: *Permits, *Drilling, *Oil industry, *Texas, *Environmental effects, Pipelines, Turbidity, Oil spills, Estuaries, Dredging, Drilling equipment, Recreation, Navigation, Navigable waters, Aesthetics, Lagoons, Land subsidence.
Identifiers: *Environmental Impact Statements, Coastal waters.

This action concerns the continued issuance of permits for erection of structures and construction of ancillary facilities associated with exploration for and production of crude petroleum and natural gas within the coastal waters, lagoons and estuaries of Texas, subject to imposition of certain additional limitations and restrictions based on environmental considerations. The prospective drilling will have only a minimal impact on the environment if associated discharges are properly controlled. The placing of pipelines, dredging and spoiling may harm the marine habitat, create water turbidity and siltation and damage archaeological sites in the affected areas. It is unlikely that large scale production potential will be encountered in these shallow formations. Additionally large concentrations of well structures may pose a navigation hazard and detract from the aesthetic value of the seascape. (Smith-Adam-Florida)
W73-08661

WATER QUALITY IN A STRESSED ENVIRONMENT, READINGS IN ENVIRONMENTAL HYDROLOGY.

Burgess Publishing Company, Minneapolis, Minnesota, 1972. W.A. Pettyjohn, editor. 309 p, 19 fig, 16 map, 19 tab, 11 chart, 63 ref.

Descriptors: *Water pollution, *Water pollution control, *Surface-groundwater relationships, *Water law, Surface waters, Ground waters, Hydrology, Water resources, Water conservation, Water consumption, Water control, Water demand, Water rights, Governments, Judicial decisions, Legal aspects, Water pollution effects, Trace elements, Water pollution sources, Water sources, Water supply, Water utilization, Water management (Applied).
Identifiers: Hazardous substances (Pollution), U.S. Army Corps of Engineers.

The selected papers deal primarily with groundwater and surface water contamination in an attempt to point out a few significant occurrences in water pollution that have been reported over the last twenty-five years. The book is divided into six major headings: (1) The Water We Drink, (2) Sources of Surface-Water Pollution, (3) Geologic Controls and Ground-Water Pollution, (4) Examples of Ground-Water Pollution, (5) Trace Elements--A New Factor in Water Pollution, and (6) Water Pollution and Legal Controls. The readings have been drawn mainly from scientific journals and governmental publications. The three articles on water law have wide application in environmental problems including legal approaches to water rights, enforcement of the 1899 Refuse Act through citizen action, and the role of the Army Corps of Engineers in preventing the destruction and pollution of our waters and wetlands. An epilogue looks into the future of environmental monitoring. (Dunham-Florida)
W73-08662

RIVER ECOLOGY AND MAN.
For primary bibliographic entry see Field 06G.
W73-08664

HEARING FOR THE REVIEW AND REVISION OF MISSOURI'S WATER QUALITY STANDARDS.
Missouri Clean Water Commission, Jefferson City.

March 21, 1973. 15 p.

Descriptors: *Water quality standards, *Federal Water Pollution Control Act, *Water pollution control, *Missouri, Environmental effects, Water pollution, Administrative agencies, Governmental interrelations, Water sources, Legislation, Administrative decisions, Regulations, Water management (Applied), Water quality, Public health, Water utilization, Flow, Streams, Lakes, Rivers, Ecology, Institutions, State governments.
Identifiers: Missouri Clean Water Law.

In an attempt to comply with the Federal Water Pollution Control Act of 1972, the following proposed revisions and changes to Missouri's existing Water Quality Standards are made. The water quality characteristics of Missouri's streams will be published and referenced in the introduction. Existing statutory authority and approval standards will be revised to reflect the authority granted in the Missouri Clean Water Law. Additions or deletions resulting from a hearing will be made to water uses and stream classification. Streams and lakes will be classified according to their use as provided in an attached use classification. Water quality criteria will be revised in relation to general criteria, water quality, flow, stream sampling and analytical testing. Programs to control water pollution will be summarized including a list of regulations to be promulgated by the Clean Water Commission. The Water Quality Surveillance Program will replace present compliance and time schedules and will be published as a separate document. (Dunham-Florida)
W73-08668

WATER SUPPLIES.

Rules--State of Florida Department of Health and Rehabilitative Services, Division of Health, ch. 10D-4 secs 4.01 thru 4.15 (1971).

Descriptors: *Florida, *Water quality control, *Water supply, *Potable water, Water purification, Legal aspects, Regulation, Water utilization, Public health, Municipal water, Water demand, Wells, Well permits, Well regulations.

Rules concerning water supplies as promulgated by the State of Florida Department of Health and

Rehabilitative Services are presented. The rules cover such areas as water supply in general, potable water standards, approval of public water supply systems, application for well drilling permits, abandonment of water supply wells, potable water in places serving the public, location and construction of water supply wells, and fluoridation of public water supply systems. Under the rules, a public water supply system is defined as a system serving more than twenty-five persons or otherwise making water available to public groupings or the public in general; including works and auxiliaries for collection, treatment, storage, and distribution of water from a source or sources of supply to the free-flowing outlet of the ultimate consumer. Graphic, charts, chemical analysis techniques, and other pertinent information are included. (Mockler-Florida)
W73-08670

HYDROPNEUMATIC STORAGE FACILITIES.
Illinois State Environmental Protection Agency, Springfield. Div. of Public Water Supplies.

Technical Release No. 10-8, (1972). 2 p.

Descriptors: *Illinois, *Water storage, *Pumped storage, *Storage capacity, Storage, Storage tanks, Surplus water, Water distribution (Applied), Water supply, Water tanks, Water shortage, Water supply development, Flow rates, Flow measurement, Pumps, Pumping.
Identifiers: Illinois Environmental Protection Act, Illinois Public Water Supply Control Law.

Following the enactment of the Illinois Public Water Supply Control Law of 1951 and the Environmental Protection Act, many existing subdivision water supplies are being classified as public water supplies. Many subdivisions must develop their own water supply facilities, and in many of these supplies, hydropneumatic storage facilities exist or are proposed. A study was done on these tanks, and a total gross volume of 35 gallons per capita was recommended as the optimum size. The maximum flow rate was calculated to be 62.5 g.p.m. in a water system consuming 15,000 gallons a day. An air compressor of proper size should be provided to maintain the air cushion in the pressure tank. Finally, the actual capacity of the well pump should be greater than the maximum hourly rate of consumption. (Glickman-Florida)
W73-08671

LIMESTONE POLICY.
Illinois State Environmental Protection Agency, Springfield. Div. of Public Water Supplies.

Technical Release No. 10-6, (1972). 2 p.

Descriptors: *Groundwater resources, *Illinois, *Chlorination, *Water supply treatment, Limestones, Supply treatment, Water purification, Water quality control, Water treatment, Sewage treatment, Water pollution sources, Water quality, Dependable supply, Groundwater, Water table aquifers, Water wells, Water resources, Groundwater basins.

Certain standards are recommended in protecting the safety of water supplies in the Illinois limestone areas. In heavily populated areas, a fifty foot thickness of glacial drift must exist over the bedrock limestone before the water should be used without chlorination. In rural areas, only thirty feet is necessary between the bedrock and the lowest points of pollution. A well may be in danger of contamination if it draws water from a limestone bed which crops out less than one fourth of a mile away. Where it is evident that the limestone supply is contaminated with sewage, use of the water will not be considered satisfactory unless it is treated. If water is obtained from a supply completely below the limestone, it should be chlorinated before use. (Glickman-Florida)
W73-08672

AN ANALYSIS OF ENVIRONMENTAL STATEMENTS FOR CORPS OF ENGINEERS WATER PROJECTS,
Stanford Univ., Calif. Dept. of Civil Engineering.
For primary bibliographic entry see Field 06G.
W73-08673

LEGISLATIVE NEEDS IN WATER RESOURCES MANAGEMENT IN ALABAMA,
Alabama Univ., University. Natural Resources Center.
For primary bibliographic entry see Field 06E.
W73-08674

CALIFORNIA LAWYERS LEAD ENVIRONMENTAL FIGHT,
For primary bibliographic entry see Field 06E.
W73-08675

NEW ENGLAND RIVER BASINS COMMISSION--1972 ANNUAL REPORT.
New England River Basins Commission, Boston, Mass.
For primary bibliographic entry see Field 06E.
W73-08676

CITIZEN ALERT: PUBLIC PARTICIPATION IN THE FEDERAL WATER POLLUTION CONTROL ACT AMENDMENTS OF 1972.
Natural Resources Defense Council, Washington, D.C.

Project on Clean Water, 1972. 6 p.

Descriptors: *Water pollution control, *Legislation, *Water quality control, *Federal Water Pollution Control Act, Administrative agencies, Decision making, Legal aspects, Governments, Planning, Standards, Water policy, Administrative decisions, Law enforcement, Permits, Adjudication procedure.
Identifiers: *Federal Water Pollution Control Act Amendments of 1972.

The recently enacted Federal Water Pollution Control Act Amendments of 1972 establish a broad policy of public participation in all aspects of its implementation. This newsletter describes the measures proposed by the federal government regarding public participation and presents a section-by-section analysis of the proposed regulations implementing the Amendments. Since these regulations and the laws they are designed to implement have potentially far-reaching implications, it is vital that the public take advantage of this opportunity to effect the degree and form of public participation in the national effort to clean up public waterways. It is indicated that the proposed guidelines contain inadequate provisions on public participation in enforcement and legal proceedings. This newsletter also recommends changes to the proposed regulations and presents a detailed analysis of such recommendations. Finally, all interested citizens are urged to write the Environmental Protection Agency to encourage adoption of these recommendations. (Mockler-Florida)
W73-08677

PUBLIC PARTICIPATION IN WATER POLLUTION CONTROL PROGRAMS.
For primary bibliographic entry see Field 06E.
W73-08678

A VETERAN VIEWS THE POLLUTION FIGHT,
V. J. Yannacone, Jr.
Juris Doctor, p 28-29, February 1973. 2 p, 1 photo.

Descriptors: *Pollution abatement, *Administrative agencies, *Judicial decisions, *Public health, Legal aspects, Legislation, Administrative decisions, Regulation, Institutions, Public rights, Constitutional law, Jurisdiction, Penalties (Legal), Environmental effects.
Identifiers: National Environmental Policy Act.

The fundamental environmental issues are becoming lost in a maze of procedural legal formalisms such as standing, jurisdiction and existence of a cause of action. If these trends continue the general public will be the eventual loser. The National Environmental Policy Act cannot assure environmental quality. In fact the law can't solve the environmental problems because it in part creates them. As medical evidence establishes the damaging effects of environmental degradation on life and health, environmental personal injury actions will increase and class actions seeking money damages will become more common. These class actions will also recognize that environmental rights are constitutionally protected. Lawyers must master a complex scientific background of the issues to be tried. The vast bulk of environmental litigation will concern administrative action, but current administrative agencies are incapable of considering environmental matters with the requisite degree of ecological sophistication. Thus the goal of all environmental lawyers should be the drafting of responsible and feasible legislation. (Glickman-Florida)
W73-08679

AQUATIC PLANT CONTROL AND ERADICATION PROGRAM, STATE OF TEXAS (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Galveston, Tex.
For primary bibliographic entry see Field 04A.
W73-08683

UNITED STATES V. GRANITE STATE PACKING COMPANY (VIOLATION OF REFUSE ACT OF 1899).
For primary bibliographic entry see Field 06E.
W73-08695

BANKERS LIFE AND CASUALTY COMPANY V. VILLAGE OF NORTH PALM BEACH, FLORIDA (SUIT BY RIPARIAN LANDOWNERS TO COMPEL CORPS OF ENGINEERS TO RENEW DREDGE AND FILL PERMITS).
For primary bibliographic entry see Field 06E.
W73-08696

COWELL V. COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF TRANSPORTATION (CHALLENGE TO CONDEMNATION PROCEEDINGS INSTITUTED TO PROVIDE CHANNEL IMPROVEMENT).
For primary bibliographic entry see Field 06E.
W73-08697

CHARLES COUNTY SANITARY DISTRICT, INC. V. CHARLES UTILITIES, INC. (ACTION BY WATER AND SEWER CORPORATION SEEKING JUDICIAL VALIDATION OF IT FRANCHISE).
For primary bibliographic entry see Field 06E.
W73-08699

SOIL AND WATER CONSERVATION COMMISSION AND DISTRICTS.
For primary bibliographic entry see Field 06E.
W73-08704

BOOTH V. CORN PRODUCTS CO. (TAXPAYER'S SUIT FOR RECOVERY OF COSTS OF TREATING EXCESS WASTES).
For primary bibliographic entry see Field 06E.
W73-08705

SEWERAGE SYSTEMS AND ABATEMENT OF POLLUTION FROM INDUSTRIAL WASTES.
For primary bibliographic entry see Field 06E.
W73-08718

JACKSONVILLE ELECTRIC AUTHORITY V. POLLUTION CONTROL BOARD (APPLICATION FOR PERMIT TO INSTALL ELECTRIC GENERATOR ADJACENT TO STREAM).
For primary bibliographic entry see Field 06E.
W73-08719

WATER POLLUTANTS--RECOVERY OF COST OF REMOVAL.
For primary bibliographic entry see Field 06E.
W73-08720

WATER SUPPLY AND SEWAGE SYSTEM.
For primary bibliographic entry see Field 06E.
W73-08721

SOLID WASTE DISPOSAL.
For primary bibliographic entry see Field 06E.
W73-08723

SALINE GROUNDWATER RESOURCES OF MISSISSIPPI,
Geological Survey, Jackson, Miss.
For primary bibliographic entry see Field 07C.
W73-08750

THE LARGE VARIABILITY OF WATER QUALITY IN COASTAL WATERS AND SUGGESTIONS FOR HOW WE CAN HANDLE THEM,
Massachusetts Inst. of Tech., Cambridge.
For primary bibliographic entry see Field 02L.
W73-08804

PREDICTIVE MODELS OF SALINITY AND WATER QUALITY PARAMETERS IN ESTUARIES,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 02L.
W73-08815

THE HISTORY OF HANFORD AND ITS CONTRIBUTION OF RADIONUCLIDES TO THE COLUMBIA RIVER,
Battelle Memorial Inst., Richland, Wash. Pacific Northwest Labs.
For primary bibliographic entry see Field 02L.
W73-08817

ORGANIC FILMS ON NATURAL WATERS: THEIR RETRIEVAL, IDENTIFICATION, AND MODES OF ELIMINATION,
Cornell Aeronautical Lab., Inc., Buffalo, N.Y.
For primary bibliographic entry see Field 05B.
W73-08851

ADSUBBLE PROCESSES: FOAM FRACTIONATION AND BUBBLE FRACTIONATION,
Cincinnati Univ., Ohio. Dept of Chemical and Nuclear Engineering.
R. Lemlich.
Journal of Geophysical Research, Vol 77, No 27, p 5204-5210, September 20, 1972. 4 fig, 40 ref.

Descriptors: *Bubbles, *Sea water, *Adsorption, *Foam fractionation, Diffusion, Water chemistry, Ion transport, Mass transfer, Aqueous solutions.
Identifiers: *Bubble fractionation.

Foam fractionation is a process wherby dissolved or colloidal material is selectively absorbed on the surfaces of rising bubbles and then is partially segregated by the foam. Even in the absence of foam, a bubble fractionation process may occur in the liquid, the process yielding a concentration gradient. Besides chemical factors, both processes are influenced by hydrodynamic and diffusional factors. (Knapp-USGS)
W73-08861

IMPACT OF HIGHWAYS ON SURFACE WATERWAYS,
Metropolitan Sanitary District of Greater Chicago, Ill.
For primary bibliographic entry see Field 04C.
W73-08894

INDUSTRIAL WASTE MANUAL, A GUIDE FOR THE PREPARATION OF APPLICATIONS, REPORTS AND PLANS.
Pennsylvania Dept. of Environmental Resources, Harrisburg. Bureau of Water Quality Management.
For primary bibliographic entry see Field 06E.
W73-08895

TREATMENT OF URBAN RUNOFF.,
Environmental Protection Agency, Washington, D.C. Municipal Pollution Control Section.
F. J. Condon.
Paper presented at the American Public Works Association Congress and Equipment Show, Minneapolis, Minnesota, September 21-27, 1972. 18 p, 27 ref.

Descriptors: *Urban drainage, *Water pollution, *Water pollution treatment, *Storm runoff, Water pollution sources, Urban runoff, Urban hydrology, Storm water, Erosion, Treatment.

Urban runoff has been found to be an important factor in producing water pollution. Control of this pollution is necessary to protect our water resources. A great deal of technology exists to deal with the problem of combined sewer overflow, the major point source of pollution from urban runoff. There are three major problems in dealing with the control of pollution from urban runoff; these are: (1) a lack of total system management, (2) a lack of accurate information about the quality of urban runoff, and (3) a lack of accurate knowledge about the hydrology of urban runoff. The total system of urban drainage must be studied to incorporate the interaction of causes, sources and effects of different pollutants, along with the effects on receiving waters of various corrective actions. A model of urban drainage must be developed to study the impact of various alternatives. The quality of urban runoff is a big unknown, and studies made across the country give contradictory results. Standard methods of measurement, as well as definition of pollutants, seems to be needed. Detailed information on urban hydrology on a small scale is also badly needed to be able to provide adequate facilities for control of urban runoff pollution. Control of pollutants at the source is a primary goal. It involves controlling erosion from land under development, better methods of street cleaning, reducing peak flows of storms and the use of stormwater rather than merely disposing of it. (Poertner)
W73-08898

WATER POLLUTION CONTROL, A STATE-OF-THE-ART REVIEW,
Port of New York Authority, N.Y.
For primary bibliographic entry see Field 05D.
W73-08900

THE EFFECT OF PASSAIC RIVER BENTHAL DEPOSITS ON DEOXYGENATION IN OVERLYING WATERS,
Rutgers - The State Univ., New Brunswick, N.J.
O. M. Donovan.
Available from Univ. Microfilms, Inc., Ann Arbor, Mich. 48106 Order No. 73-4738. Ph D Dissertation, 1972, 161 p.

Descriptors: *Reaeration, *Oxygen sag, Water pollution effects, Water pollution, Ammonia, Nitrates, Phosphates, Streamflow, Discharge (Water), Water analysis, cChemical analysis, Dissolved oxygen, Oxygen demand, Rates, *New Jersey.
Identifiers: *Passaic River, *Benthal deposits, Reaeration coefficients.

Field work was carried out on natural benthal deposits on the upper Passaic River using a benthal respirometer. The deposits showed an average areal oxygen demand of 2.22 grams/sq m/day, with a range of from 1.13 grams/sq m/day to 3.79 grams/sq m/day. Studies on the areal extent of the deposits allowed calculation of the average benthal demand on the overlying water as a function of the stream discharge rate. This demand ranged from 0.26 mg/l/day at 200 cfs to 0.12 mg/l/day at a discharge rate of 1400 cfs. Benthal deposits from the Passaic River, along with samples of the overlying water, were brought back to the laboratory for examination under more carefully controlled conditions. Resulting oxygen sag curves in the laboratory apparatus were examined and provided graphic examples of the capacity of pollutional sediments in the causation of adverse effects on stream oxygen balance. Quantitative studies with oxygen sag curves generated in the laboratory apparatus showed that a very close fit could be obtained between predicted and observed data. This indicated that the methods used to experimentally determine constants for use in the oxygen sag expression were reasonably accurate and could be put to use in engineering examinations of polluted rivers and streams. Corollary studies on NH3, nitrate, and phosphate concentrations in the water overlying the deposits showed that the benthal deposits released ammonia to the overlying waters and sorbed nitrate from the overlying waters. Comparative studies on the reaeration rates of highly polluted Passaic River waters as opposed to clean waters revealed no significant differences in the reaeration coefficients observed. (Holoman-Battelle)
W73-08949

FUNCTIONAL WATER AND SEWERAGE PLAN AND PROGRAM, CATAWBA REGIONAL PLANNING COUNCIL.
LBC and W Associates, Columbia, S.C.
For primary bibliographic entry see Field 06B.
W73-08977

LOWCOUNTRY REGION FUNCTIONAL WATER AND SEWER PLAN AND PROGRAM.
LBC and W Associates, Columbia, S.C.
For primary bibliographic entry see Field 06B.
W73-08978

MALIBU MASTER PLAN OF STORM DRAINS.
Los Angeles County Engineer Dept., Calif.

March, 1969. 54 p, 12 tab, 12 maps, photos. Urban Planning Project No. California P-267.

Descriptors: *Planning, *Storm drains, *Drainage, Storm runoff, Drainage basins, Floodplains, Urbanization, Topography, Maps, Storm water, *California.
Identifiers: *Stormwater drainage, Malibu, *Los Angeles County (Calif).

This report is intended to serve as a guide to both public agencies and private developers for stormwater drainage improvements, including design data and relations to county ordinances, e.g. subdivision and floodplain regulations. Stormwater drainage is important in this area of the southwestern corner of Los Angeles County

because of recent urbanization and the mountainous topography causing rapid runoff. The report and proposed drainage improvements are closely related to the General Plan for the Malibu area. Some engineering-oriented explanation of the planning procedure and some administrative and financial information is included. However, the key elements are the numerous maps, charts, and photographs. Each sub-basin in the area is shown on large fold-out maps which include existing and proposed drains, major watercourses, and natural channels. Photographs of some of the areas to be served by major storm drainage lines are also included. (Elfers-North Carolina)
W73-08980

INITIAL WATER, SEWERAGE AND FLOOD CONTROL PLAN REPORT, JOB 4800.
Duncan and Jones, Berkeley, Calif.
For primary bibliographic entry see Field 06B.
W73-08981

WATER AND SEWER FACILITIES, OSCEOLA COUNTY.
Beck (R. W.) and Associates, Denver, Colo.
For primary bibliographic entry see Field 06B.
W73-08984

WATER SUPPLY PLAN FOR THE SOUTHEASTERN CONNECTICUT REGION: SUMMARY.
Southeastern Connecticut Water Authority, Norwich.
For primary bibliographic entry see Field 06B.
W73-08985

STATEWIDE LONG-RANGE PLAN FOR THE MANAGEMENT OF THE WATER RESOURCES OF CONNECTICUT, PHASE I REPORT, 1971.
Connecticut Interagency Water Resources Planning Board, Hartford.
For primary bibliographic entry see Field 06B.
W73-08987

INCOG FUNCTIONAL PLAN SUPPLEMENTS (WATER AND SEWER, HOUSING AND OPEN SPACE).
Indian Nations Council of Governments, Tulsa, Okla.
For primary bibliographic entry see Field 06B.
W73-08989

POLLUTION CONTROL FINANCING IN THE UNITED KINGDON AND EUROPE,
Thames Conservancy, Reading (England).
H. Fish.
Journal Water Pollution Control Federation, Vol 45, No 4, p 734-741, April, 1973.

Descriptors: *Financing, Water pollution control, *Planning, Regional analysis, *Management, *Waste water disposal, Costs, *Pollution taxes (Charges), *Europe.
Identifiers: United Kingdom, Netherlands, France, Germany.

Four basic methods for financing pollution control facilities apply in part to procedures for waste water disposal financing in the United Kingdom, the Netherlands, France, and Germany. They are: (1) payment of all costs for waste water disposal by the discharger; (2) same as number 1 except that a credit is given recognizing the reuse value of the waste water discharged; (3) charges related to the volume and quantity of the waste water levied on the discharger in order to meet the costs of a public authority; and (4) a single bill of charge relating to the volume and quality of the waste water levied to the discharger by a public authority responsible for providing these services. Present and future positions are considered, and the organization of regional water authorities for the control of all regulatory and management aspects of pollution control is presented as the most practicable method of financing. (Bell-Cornell)
W73-09005

A MODEL OF A PRIVATE ENVIRONMENTAL AGENCY,
For primary bibliographic entry see Field 06E.
W73-09009

THE ALLOCATION OF TROUBLESOME MATERIAL,
T. A. Ferrar, and A. Whinston.
(1972), 19 p, 7 fig, 5 ref. OWRR-B-020-IND (16).

Descriptors: *Resource allocation, *Urban sociology, *Waste disposal, *Numerical analysis, *Optimization, Water resources, Land, Solid wastes, Costs, Recycling, Supply, Prices, Decision making, Constraints, Mathematical models, Systems analysis.
Identifiers: *Nondisposable materials, Material property rights, Urban centers, Land areas, Iterative processes, Incentive-feedback algorithm, Government commissions, Environmental standards, Allocation programs, Synthetic materials, Raw materials.

Orientation to convenient containers and the production and sale of virtually nondisposable packaging materials for containerization threaten the land areas surrounding urban centers. The supply price of these materials incorrectly reflects the cost burden on society--the true cost of disposal of these materials is presently shielded from the packaging industry; thus, we experiencing an oversupply of containers made of these materials. It is recommended that an optimal quantity of these materials be permitted to enter the urban region per period; this optimal quantity should reflect the particular waste disposal capacity of the region for these materials and the preference structure of the population for these materials relative to substitute packaging means. A model is developed for determining the allocation of material-usage property rights to the distributors of packaged products that is consistent with government-specified standards. To enforce these environmental standards, a management agency would be created, with the task of allocating the legal material usage rights in accordance with the provided goal function among the distributers of the community. The method utilized to accomplish this task involves an incentive-feedback algorithm that iteratively allocates the supplies among the distributors. (Bell-Cornell)
W73-09010

JIM KEE SPEAKS ON WATER RESOURCES,
House, Washington, D.C.
For primary bibliographic entry see Field 06E.
W73-09011

NEW CONCEPTS IN SITING OF NUCLEAR POWER PLANTS,
House, Washington, D.C.
For primary bibliographic entry see Field 06E.
W73-09012

HERCULES CONTINUES TO FIGHT POLLUTION,
House, Washington, D.C.
For primary bibliographic entry see Field 06E.
W73-09015

BIOASTRONAUTICS DATA BOOK, SECOND EDITION.

Washington, D.C.: U.S. Government Printing Office, $7.50. 1973, 930 p.

Descriptors: *Water quality standards, *Water quality control, Potable water, Water supply, Recycling, Water reuse, Pollutant identification.
Identifiers: *Space craft water quality standards.

Chapter 10, Toxicology, section on Water Quality Standards for Space Missions, (p478-487) states that requirements for space craft water quality standards are based on aesthetics or physical criteria, trace chemical content, and microbiological impurities. It was decided that the water quality standards need not be as stringent as those used for municipal water supplies since the latter are established to protect a broad spectrum of the population. Two tables are included in the report giving space craft water quality standards for physical properties and space craft water quality standards for chemical content respectively. (See also W73-09017) (Smith-Texas)
W73-09016

AEROSPACE VEHICLE WATER-WASTE MANAGEMENT,
National Aeronautics and Space Administration, Washington, D.C.
J. N. Pecoraro.
In: Bioastronautics Data Book, Second Edition, Chapter 20, National Aeronautics and Space Administration SP-3006 p 915-922, 1973. 3 fig, 1 tab, 9 ref.

Descriptors: *Waste storage, *Waste disposal, *Wastes, Air pollution, Water quality control, Water reuse, Recycling, Ultimate disposal, Solid waste, Liquid wastes.
Identifiers: *Waste management, *Aerospace program.

Various aerospace vehicle waste management systems are evaluated. In a space craft, wastes must be collected and transported to storage and/or recovery process equipment in such a manner that they do not contaminate the crew and the internal environment of the vehicle. If the wastes are to be stored on board for an extended period of time, they should be sterilized to avoid contamination if the storage vessel fails. The objective of the urine and liquid waste collection and transport subsystem is to provide a means for collecting and transporting these wastes to the water management subsystem, where treating and processing are performed. Biodegradation, vacuum thermal drying, and incineration are some of the currently considered methods for disposing of solid waste. The results of the processing must be either stored in an aesthetic and sanitary manner or dumped overboard to protect the crew from microorganisms and noxious gases. The simplest and most versatile method for storing all types of wastes is vacuum drying to remove the water necessary for biological mobility and growth. This technique does not destroy the microorganisms, but it does inactivate them sufficiently to permit storage in a plastic bag for periods of 120 days or more. (See also W73-09016) (Smith-Texas)
W73-09017

PLASTIC PACKAGING AND COASTAL POLLUTION,
Aston Univ., Birmingham (England). Dept. of Chemistry.
G. Scott.
Int J Environ Stud. Vol 3, No 1, p 35-36. 1972.
Identifiers: *Coastal pollution, *Plastic packaging, Pollution wastes, Water pollution control.

Pollution of shore line due to plastic packaging is a result of the deposition of seaborne waste. The waste is a by-product of international commerce and not due to irresponsibility of casual visitors. Common packaging plastics vary markedly in their resistance to environmental breakdown. Low density polyethylene which is used for agricultural sacks, wrapping film and detergent bottles survives unchanged for many years, whereas high

density polyethylene which is used for bleach and sanitary fluid, and other rigid containers embrittles and eventually disappears by absorption into the environment on very prolonged outdoor exposure. The survey indicates a need for the acceleration of this process.–Copyright 1972, Biological Abstracts, Inc.
W73-09071

MATHEMATICAL SIMULATION OF THE TURBIDITY STRUCTURE WITHIN AN IMPOUNDMENT,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
D. G. Fontane, J. P. Bohan, and J. L. Grace, Jr.
Research Report H-73-2, March 1973. 22 p, 3 fig, 3 plate, 6 tab, 7 ref.

Descriptors: *Turbidity, *Reservoir silting, *Stratification, *Mathematical models, Simulation analysis, Withdrawal, Water pollution control, Water quality, Suspended load, Distribution patterns.

The turbidity structure of an impoundment was simulated using a mathematical model capable of simulating physical and chemical characteristics. Turbidity was handled as a conservative chemical substance. The model was used to predict the thermal and turbidity structures of an existing impoundment and was verified with observed data. The model was then used to predict the turbidity structure of a proposed impoundment. The effectiveness of selective withdrawal and, in particular, of a low-level outlet in controlling the turbidity structure of an impoundment was demonstrated. (Knapp-USGS)
W73-09081

DEVELOPMENT OF A DISCHARGE MEASUREMENT DEVICE FOR SEWER FLOW,
Illinois Univ., Urbana. Dept. of Civil Engineering.
For primary bibliographic entry see Field 07B.
W73-09085

06. WATER RESOURCES PLANNING

6A. Techniques of Planning

USE OF ADVANCED WATER RESOURCES PLANNING TECHNIQUES IN THE DEVELOPMENT OF REGIONAL WATER QUALITY MANAGEMENT PROGRAMS,
Clemson Univ., S.C. Dept. of Environmental Systems Engineering.
For primary bibliographic entry see Field 05G.
W73-08461

THE COLHEAT RIVER SIMULATION MODEL.
Hanford Engineering Development Lab., Richland, Wash.
For primary bibliographic entry see Field 05B.
W73-08624

ACADEMIC PROGRAMS IN ENVIRONMENTAL STUDIES,
California Univ., Berkeley. Sanitary Engineering Research Lab.
P. H. McGauhey.
In: Water Resources Seminar Series No 1, January 1972. Water Resources Research Center, University of Hawaii, Honolulu. p 15-23.

Descriptors: *Universities, *Education, Environment, Occupations, Management.
Identifiers: Multi-disciplinary courses.

Any university can bring to bear on the problems of environmental management by utilizing the organizational structure and the talents which have made it a great institution without tearing down any ivy or cracking any marble. It can be done while giving the individual student the freedom to pursue his particular area of interest throughout his college years and yet insure that he will emerge with a broad understanding of the interrelationship of man and his environment plus an understanding of how to bring some special areas of knowledge to bear upon environmental problems in concert with other areas of knowledge. A university can emphasize environmental problems without neglecting other areas of emphasis and a way can and should exist for every student to develop his area of interest continuously throughout his educational program. The field of environmental management is too broad to be encompassed by any single program of studies, as all disciplines are relevant to environmental management and in the real world the 'manager' may come from any disciplinary background. Every individual must have some cohesive body of knowledge that he can apply to environmental problems thus dispensing with an environmental generalist. (Auen-Wisconsin)
W73-08648

CONCEPTS FOR ANALYSIS OF MASSIVE SPILL ACCIDENT RISK IN MARITIME BULK LIQUID TRANSPORT,
Coast Guard, Washington, D.C. Office of Research and Development.
For primary bibliographic entry see Field 05G.
W73-08654

KNOW WHAT'S HAPPENING IN YOUR WATER SYSTEM,
Parsons, Brinckerhoff, Quade and Douglas, Inc., New York.
For primary bibliographic entry see Field 04A.
W73-08655

VALUATION OF TIMBER, FORAGE AND WATER FROM NATIONAL FOREST LANDS,
Forest Service (USDA), Tucson, Ariz. Rocky Mountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 06B.
W73-08657

THE CHESAPEAKE BAY INVENTORY SYSTEM,
Johns Hopkins Univ., Baltimore, Md. Dept. of Radiology.
For primary bibliographic entry see Field 02L.
W73-08809

COASTAL ZONE MANAGEMENT SYSTEM: A COMBINATION OF TOOLS,
Center for the Environment and Man, Inc., Hartford, Conn.
For primary bibliographic entry see Field 02L.
W73-08810

PREDICTIVE MODELS OF SALINITY AND WATER QUALITY PARAMETERS IN ESTUARIES,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 02L.
W73-08815

SOUTH SANTA CLARA COUNTY WATER PLANNING STUDY COMPLETION REPORT.
Santa Clara County Flood Control and Water District, San Jose, Calif.
For primary bibliographic entry see Field 06B.
W73-08979

MALIBU MASTER PLAN OF STORM DRAINS.
Los Angeles County Engineer Dept., Calif.
For primary bibliographic entry see Field 05G.
W73-08980

ANALYSIS AND OPTIMIZATION OF TWO-STATE DIGESTION,
Kansas State Univ., Manhattan. Dept. of Chemical Engineering.
For primary bibliographic entry see Field 05D.
W73-09007

COLLECTIVE UTILITY IN THE MANAGEMENT OF NATURAL RESOURCES: A SYSTEMS APPROACH,
Arizona Univ., Tucson. Dept. of Systems Engineering.
E. G. Dupnick.
Technical Reports on Hydrology and Water Resources. Technical Report No 5, June 1971, Arizona University, Tucson. 172 p, 8 fig, 112 ref. OWRR A-024-ARIZ (5). 14-31-0001-3503.

Descriptors: *Planning, Operations, *Natural resources, *Management, Economics, Systems analysis.
Identifiers: Multicriteria, Cost effectiveness, *Collective utility, Externalities.

The main purpose is to develop an economic theory, along the lines of the Bergson-Samuelson social welfare theory, to regulate the utilization of natural resources in the long-term interest of a political-economic group of individuals and firms. The theory, called Collective Utility, qualifies as a 'systems approach' because of its inherent flexibility, generality, and comprehensiveness. Collective Utility is a function of individual satisfactions and firm revenues, which are, in general, contingent upon the actions of other individuals and/or firms. Such interactions are called externalities. Efficient management of natural resources will follow from efficient control of externalities. A taxation-subsidy structure is suggested as an efficient control and the complete mathematics of determining and implementing such a structure are provided. Finally, the idea of externalities is integrated within the framework of Collective Utility to form an optimal policy for the utilization of natural resources using the techniques of calculus of variations.
W73-09074

6B. Evaluation Process

AN ANALYTICAL INTERDISCIPLINARY EVALUATION OF THE UTILIZATION OF THE WATER RESOURCES OF THE RIO GRANDE IN NEW MEXICO,
New Mexico State Univ., University Park. Dept. of Agricultural Economics.
R. R. Lansford, S. Ben-David, T. G. Gebhard, Jr., W. Brutsaert, and B. J. Creel.
Available from the National Technical Information Service as PB-220 070, $3.00 in paper copy, $1.45 in microfiche. New Mexico Water Resources Research Institute, Las Cruces, Completion Report 020, March 1973, 152 p, 18 fig, 39 tab, 91 ref, 2 append. OWRR B-026-NMEX (1), B-019-NMEX (1), and B-016-NMEX (1).

Descriptors: *New Mexico, *Water demand, Economics, *Water resources development, Management, *Economic prediction, *Surface-groundwater relationships, Natural resources, Water requirements, Resource allocation, River basin, Groundwater management, Water law, Interstate compacts, International compacts, Treaties, Litigation, Water quality, *Water utilization, Human population, Employment, Industrial water, Recreation, Water management (Applied), Linear programming, Model studies.
Identifiers: *Rio Grande Basin, *Socio economic models, *Interdisciplinary, Groundwater appropriation, Input-output coefficients, Conjunctive use models, Economic land classification, Groundwater models, Irrigation water diversions.

An interdisciplinary approach to the solution of the water resource problems of the Rio Grande region in New Mexico was conducted. The primary objective was the evaluation of the social and economic impacts of alternative water-use policies. A socio-economic model was developed to represent the New Mexico economy, with special emphasis placed upon the Rio Grande region. Inputs into the socio-economic model were obtained from separate studies covering the hydrological, agricultural, municipal, and industrial areas. Three sets of alternatives were considered: (1) growth without a water constraint; (2) growth, holding surface water constraint; (3) growth, holding both surface and groundwater constraint. Without a water constraint, both production and depletions are expected to exhibit the largest increase (59.2 percent and 49.6 percent, respectively). When a surface water constraint is imposed, the value of production is reduced by ohly $5.6 million in the year 2000, and by $14.2 million in 2020; water depletions are expected to decrease about 27 percent by 2020. When a total water constraint is imposed, the value of production is decreased $2.7 million below that expected when using only a surface water constraint, and water depletions are reduced only slightly. (Creel-New Mexico State)
W73-08458

ORGANIZATION OF LAND AREA IN WASHINGTON FOR WATER AND LAND USE PLANNING,
Washington State Univ., Pullman. Dept. of Agronomy and Soils.
For primary bibliographic entry see Field 06E.
W73-08607

WHERE WILL NUCLEAR POWER BE IN 1980,
Bechtel Corporation, Michigan.
For primary bibliographic entry see Field 06D.
W73-08613

VALUATION OF TIMBER, FORAGE AND WATER FROM NATIONAL FOREST LANDS,
Forest Service (USDA), Tucson, Ariz. Rocky Mountain Forest and Range Experiment Station.
P. F. O'Connell.
The Annals of Regional Science, Vol vi, No 2, p 1-14, December 1972. 3 fig, 18 ref.

Descriptors: Forest watersheds, *Management, *National forests, Water resources, *Forages, *Evaluation, Methodology, Decision making, Linear programming, Constraints, Prices, Economics, Water yield, *Arizona, Mathematical models, Systems analysis, *Lumber.
Identifiers: *Salt-Verde Basin (Arizona), *Tradeoff values.

Conservation is no longer adequate by itself for justifying the kind of expenditures required on public lands. With more people and increasing affluence, greater demand is being placed on limited forest resources. Extensive management for timber and forage will be replaced gradually by intensive management for outdoor recreation, landscape esthetics, water, and wildlife, in addition to intensive timber and forage management. This trend is especially noticeable in the Salt-Verde Basin in central Arizona, where water users have been urging authorities to increase the water yield in the basin. To make a decision regarding the extent of watershed treatments, tradeoff criteria are required. A methodology is discussed for determining the relative tradeoff values for timber, forage, and water; the data used are specifically from the Salt-Verde Basin, but the procedure is appliable to any National Forest lands. The use of economic criteria is the most logical way to judge the relative worth to society of timber, forage and consumptive water. Since each of these three resources is used as an input into a production process, a range of resource values is derived from the price of lumber, livestock, and feed grains, using a valuation model. A multiple-use linear programming model for analyzing the range of values is then discussed. Results are presented in detail. (Bell-Cornell)
W73-08657

CROPPING PATTERN, YIELDS AND INCOMES UNDER DIFFERENT SOURCES OF IRRIGATION (WITH SPECIAL REFERENCE TO IADP DISTRICT ALIGARH, U.P.),
Pant Coll. of Tech., Pantnagar (India).
For primary bibliographic entry see Field 03F.
W73-08658

MEASURING BENEFITS GENERATED BY URBAN WATER PARKS,
Dornbusch (David M.) and Co., Inc., San Francisco, Calif.
A. H. Darling.
Land Economics, Vol XLIX, No 1, p 22-34, February 1973. 1 fig, 9 tab, 3 equ, 6 ref.

Descriptors: Water resources, *Parks, *Benefits, *Property values, Evaluation, Lakes, *Linear programming, *California, Mathematical models, Estimating, Recreation, Real property, Methodology, Ponds, Demand, *Urbanization.
Identifiers: *Water parks, Interviews, Residents, Lake Merritt (Cal.), Lake Murray (Cal.), Santee Lakes (Cal.).

A number of projects have outputs that are not sold in the open market, and these outputs require some measure other than price to value their benefits. Public park project outputs are of this type, consisting primarily of recreation and aesthetic quality. Presented is a method for evaluating urban water parks benefits, which regards increases in the value of property near urban parks as a measure of the benefits derived. Results are reported of an attempt to measure the benefits of three urban water parks in California using a property value model similar to that of Kitchen and Hendon, and using an interview technique similar to that developed by Davis for the Maine woods. The three water parks chosen are: (1) located within urban areas; (2) significantly developed for recreation; and (3) analytically tractable. Characteristic differences between the sites provide a basis for testing the efficiency of the method for a wide range of water resources and urban characteristics. It is concluded that: (1) the value of an urban water park is measurable; (2) the value of an urban water resource is apparently large; and (3) regardless of the limited sample size available in this study, the techniques presented have merit for evaluating such intangible benefits. (Bell-Cornell)
W73-08659

FEDERAL DECISIONMAKING FOR WATER RESOURCE DEVELOPMENT, IMPACT OF ALTERNATIVE FEDERAL DECISION-MAKING STRUCTURES FOR WATER RESOURCES DEVELOPMENT,
Michigan State Univ., East Lansing. Dept. of Agricultural Economics.
A. A. Schmid.
Available from the National Technical Information Service as PB-211 441, $5.45 in paper copy, $1.45 in microfiche. Report prepared for National Water Commission, December 1971. 99 p, 1 fig, 43 ref.

Descriptors: *Water resources development, *Decision making, *Administrative decisions, *Adjudication procedure, Administration, Governments, Coordination, Comprehensive planning, Legislation, Legal aspects, Water management (Applied), Governmental interrelations, Institutional constraints.

An extensive and comprehensive discussion is presented of the impact of alternative federal decision-making structures and the effects of federal decision making on water resources development. The important criteria for choice among decision making structures are described and the impacts of a number of alternative structures are assessed. The general discussion is divided into three parts. First, the pros and cons of movements toward consolidation of agencies are discussed. Second, external bargaining rules are specified with respect to agency-clientele bargaining, interagency bargaining, state-federal and state-state bargaining and finally market bargaining. The third part is concerned with bargaining and management internal to the agency. Detailed consideration must be given to organizational changes that affect negotiation rules and the rules that shape the kind of information available to various interested groups. (Mockler-Florida)
W73-08669

AN ANALYSIS OF ENVIRONMENTAL STATEMENTS FOR CORPS OF ENGINEERS WATER PROJECTS,
Stanford Univ., Calif. Dept. of Civil Engineering.
For primary bibliographic entry see Field 06G.
W73-08673

THE CALIFORNIA STATE WATER PROJECT SUMMARY: NINETEEN-SEVENTY-ONE.
California State Dept. of Water Resources, Sacramento.
For primary bibliographic entry see Field 04A.
W73-08749

TOOLS FOR COASTAL ZONE MANAGEMENT.
Marine Technology Society, Washington, D.C. Coastal Zone Marine Management Committee.
For primary bibliographic entry see Field 02L.
W73-08802

METHODS FOR ENVIRONMENTAL PLANNING OF THE CALIFORNIA COASTLINE,
California Univ., Berkeley. Dept. of Landscape Architecture.
For primary bibliographic entry see Field 02L.
W73-08808

MARINE TECHNOLOGY TRANSFER DEPENDS UPON INFORMATION TRANSFER,
Environmental Protection Agency, Washington, D.C. Div. of Water Quality Standards.
For primary bibliographic entry see Field 02L.
W73-08812

EVALUATION OF COASTAL ZONE MANAGEMENT PLANS THROUGH MODEL TECHNIQUES,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 02L.
W73-08813

REVIEW OF COMMERCIAL FISHERIES IN THE COLUMBIA RIVER AND IN CONTIGUOUS OCEAN WATERS,
National Marine Fisheries Service, Seattle, Wash. Exploratory Fishing and Gear Research Base.
For primary bibliographic entry see Field 02L.
W73-08820

A DESCRIPTION AND ANALYSIS OF COASTAL ZONE AND SHORELAND MANAGEMENT PROGRAMS IN THE UNITED STATES,
Michigan Univ., Ann Arbor. Sea Grant Program.
For primary bibliographic entry see Field 02L.
W73-08887

YAQUINA BAY MARINE DEVELOPMENT PLAN.
Skidmore, Owings and Merrill, Portland, Oreg.
For primary bibliographic entry see Field 02L.
W73-08888

FUNCTIONAL WATER AND SEWERAGE PLAN AND PROGRAM, CATAWBA REGIONAL PLANNING COUNCIL.
LBC and W Associates, Columbia, S.C.

Report prepared for Catawba Regional Planning Council, Rock Hill, South Carolina, May 1972. 118 p, 6 fig, 24 tab, 13 ref. HUD S.C.-04-00-0050-21-2 c.

Descriptors: *Planning, *Water demand, *Water management, Water supply, Sewerage, Financing, Pollution abatement, Waste water disposal, Design criteria, *South Carolina, *Regional development.
Identifiers: *Utility extension planning, Inventory, Land use control, Catawba Region (South Carolina).

A comprehensive plan and implementation program for water supply and sewerage systems in a four county area in South Carolina is presented. The first section includes various data on the hydrology of the area and emphasizes the importance of the surface water quality as many streams pass through the region to other urban areas. The next two sections present an inventory and analysis of the existing water and sewerage systems. This includes an evaluation of their adequacy to meet growing demands and an identification of problems such as poor soil conditions and overloaded treatment plants. Sections on goals and design criteria emphasize orderly extension of facilities and water quality preservation. The plan is presented county-by-county and is based upon population growth projections, cost functions, impacts on natural resources, and a strategy of land use control. A final section discusses financing and priorities for specific projects. The plan consists of several sub-regional systems since the counties are not urbanized to the level that would call for a single integrated system. (Elfers-North Carolina)
W73-08977

LOWCOUNTRY REGION FUNCTIONAL WATER AND SEWER PLAN AND PROGRAM.
LBC and W Associates, Columbia, S.C.

Available from the National Technical Information Service as PB-213 220, $7.50 in paper copy, $1.45 in microfiche. Report prepared for Lowcountry Regional Planning Council, Yemassee, South Carolina, June 1972. 94 p, 6 fig, 22 tab, 19 ref. S.C.-04-00-0050 (g).

Descriptors: *Planning, *Water management, Water supply, Sewerage, Financing, Design criteria, Pollution abatement, Waste water disposal, *Regional development, Urbanization, *South Carolina.
Identifiers: *Utility extension planning, *Beaufort (South Carolina), Inventory, Land use control, Lowcountry Region (South Carolina).

A water supply and sanitary sewerage plan and implementation program for the four county region around Beaufort, South Carolina, is presented. The plan is one element of a comprehensive planning process for the area and was developed concurrently with a population and economic base study and a land use plan. The two main objectives of the plan are to determine the water resources requirements for the region and to provide a basis for orderly regional development. The plan will serve as a guide to the regional clearinghouse in its review of applications for federal grants. The report includes a section on planning determinants such as population projections, financial considerations, and environmental problems, a section on water resource data, sections on goals and design criteria, and county-by-county analysis of existing water supply and wastewater disposal facilities. The plan and implementation program is also presented county-by-county and is divided into short range improvements and long range policies. (Elfers-North Carolina)
W73-08978

SOUTH SANTA CLARA COUNTY WATER PLANNING STUDY COMPLETION REPORT.
Santa Clara County Flood Control and Water District, San Jose, Calif.

Available from the National Technical Information Service as PB-213 231, $3.50 in paper copy, $1.45 in microfiche. Final report, August 1972. 24 p, 1 append. Calif. P-277. Calif. P2-77 (G).

Descriptors: *Planning, *Water supply, *Optimization, *Water allocation, Linear programming, Dynamic programming, Scheduling, Water demand, Cost analysis, Systems analysis, *California, Urbanization.
Identifiers: *Santa Clara County (Calif).

Water supply and allocation for the fast growing southern part of Santa Clara County is discussed in this planning report which is a summary of a computer oriented water resource management study. The basic objective was to meet water supply demands to 2020 via the optimal allocation of water and staging of the system elements. Projections of population and land use together with information on geology, hydrology, existing reservoirs, and economic relationships were used to formulate optimal water management systems. Linear and dynamic programming techniques were used to arrive at the optimal combinations of system elements (e.g. reservoirs, wastewater reclamation, importing of water) and their timing. Such computer tools are not only useful for the present study, but the programs can be used for future allocations and plan modifications. (Elfers-North Carolina)
W73-08979

INITIAL WATER, SEWERAGE AND FLOOD CONTROL PLAN REPORT, JOB 4800.
Duncan and Jones, Berkeley, Calif.

Summary report prepared for the San Diego County Comprehensive Planning Organization, San Diego, California, June 1972. 82 p, 5 maps, 4 tab. HUD P-384 (g).

Descriptors: *Planning, *Water supply, *Sewerage, *Flood control, Environmental effects, Coordination, Administration, Water reuse, *California, Urbanization.
Identifiers: *Utility extension planning, Extension policies, Urban development patterns, *San Diego County (Calif).

Plans and policies for the extension of water supply, sanitary sewerage and flood control facilities are presented. One of the main purposes is to establish a set of policies to guide water resources planning and management in San Diego County. These policies particularly relate to carrying out water resources planning as an integral part of the overall planning for the county and to use the water systems extensions to help guide urban development patterns. The report is divided into five sections: (1) an introduction which explains the relation of water resources planning to other planning activities; (2) goals and policies, particularly extension policies, emphasizing environmental quality and relations to land use patterns; (3) the adequacy of the existing water resource systems (much greater detail on this is presented in a technical report of the same title); (4) the proposed improvements program presented via long lists of each project, its costs and priority; and (5) a proposed program and organization for implementation wherein governmental responsibilities and organization are discussed. Five large fold-out maps are included. (Elfers-North Carolina)
W73-08981

WATER AND SEWERAGE DEVELOPMENT PLAN, SUMTER COUNTY, SOUTH CAROLINA.
Palmer and Mallard and Associates, Inc., Sumter, S.C.

Report prepared for Sumter County Planning Board, Sumter, South Carolina, July 1968. 100 p, 26 tab, 21 map, 11 ref, 1 append.

Descriptors: *Planning, Water demand, *Water supply, *Sewerage, Agriculture, *South Carolina, *Rural areas.
Identifiers: *Utility extension planning, Inventory, Land use plan, Sumter County (South Carolina).

A water supply and sewerage plan for Sumter County is outlined in very general form on maps of the ten planning districts in the county. The planning period extends to 1985. Both the water and sewerage plans consist of several small systems since the county is not yet very urbanized. The report focuses on background data for the plan and the relation of water and sewerage services to the land use plan. Thus, there are sections on population, the economic base, agricultural land patterns, natural resources, public facilities, water resources, and a county land use plan. The study was sponsored by the Farmers Home Administration, which gives assistance in developing small, rural-oriented water resource systems. More of a comprehensive collection of planning data than a detailed water and sewerage plan, one section is devoted to proposed water and sewerage systems with detailed maps provided for individual areas. A proposed Sumter County Master Plan which will complement this water and sewerage plan is now in process. (Elfers-North Carolina)
W73-08982

WATER AND SEWER FACILITIES, OSCEOLA COUNTY.
Beck (R. W.) and Associates, Denver, Colo.

Report prepared for Orange-Seminole-Osceola Planning Commission, Orlando, Florida, November 1969. 104 p, 4 map, 21 tab, 6 append. HUD Fla. P-92.

Descriptors: *Planning, *Water supply, *Sewerage, Comprehensive planning, Environmental effects, Urbanization, Financing, Administration, *Florida, Urbanization.
Identifiers: *Utility extension planning, *Osceola County (Florida), East Central Florida Region.

Long-range water supply and sewerage plans for Osceola County are part of the overall Comprehensive Development Plan for the county and are based on the previously completed plan elements of land use, transportation, recreation, and open space. These plan elements were used to determine service areas, demands, and line and treatment plant locations. The plans use a 'wholesaling concept' in which the County provides the major facilities throughout the area. The main objectives are to provide good service at minimum cost, to project the environmental quality of the area, especially the lakes, and to promote orderly development. The study is divided into four main parts: (1) an analysis of existing facilities; (2) long-range (to 1990) water and sewerage plans; (3) financial considerations including water and sewer charges; and (4) a discussion of organization and implementation measures. There are also appendices on hydrology, geology, design

criteria, treatment, and a glossary. (Elfers-North Carolina)
W73-08984

WATER SUPPLY PLAN FOR THE SOUTHEASTERN CONNECTICUT REGION: SUMMARY.
Southeastern Connecticut Water Authority, Norwich.

February 1970. 11 p, 3 fig, 3 map, 4 tab. U.P.A. Conn. P-104.

Descriptors: *Planning, *Water supply, Administration, Financing, Water demand, Water sources, *Connecticut, *Regional development.
Identifiers: Inventory, Southeastern Connecticut, Service areas, Load centers.

This summary covers the major sections of a comprehensive two volume study with a few descriptive paragraphs, a number of charts, and several maps. Volume I is basically an inventory of the 74 water supply systems in the region in 1969. Included in the inventory are the service areas, the rates of use, sources of supply, treatment, transmission and distribution facilities, and storage. Volume II presents the recommended water supply plan for the region through the year 2020, and the analysis leading to the formulation. This includes projections of population growth and water demands, analysis of surface water and groundwater supplies, determination of construction costs, and considerations about administration and coordination. The recommended plan is framed in terms of a central system and several outlying 'load centers' and is planned in four construction phases. The creation of the Southeastern Connecticut Water Authority is a key element in the implementation of the Plan. (See also W73-08986) (Elfers-North Carolina)
W73-08985

WATER SUPPLY PLAN FOR THE SOUTHEASTERN CONNECTICUT REGION, VOLUME I, INVENTORY.
Southeastern Connecticut Water Authority, Norwich.

September 1969. 167 p, 22 fig, 3 tab, 1 append. U.P.A.Conn. P-104.

Descriptors: *Planning, Water supply, Water quality, Water rates, Operation and maintenance, Water demand, *Connecticut, *Regional development.
Identifiers: *Inventory, Southeastern Connecticut, Service areas.

A detailed inventory of all existing water supply systems in Southeastern Connecticut is presented. The inventory is the first phase of a water supply study and plan formulation being carried out jointly by the newly formed Southeastern Connecticut Water Authority (1967) and the regional planning agency. The Water Authority has broad powers to construct, operate, and maintain regional water supply systems. The inventory covers each of the 74 existing systems in the region in great detail including numerous maps. Data are presented relating to various physical, institutional, and economic base aspects of the specific service area, the population served, source of water supply, plant operating characteristics, water quality, and water rates. Schematic diagrams of many of the systems are also presented. (See also W73-08985) (Elfers-North Carolina)
W73-08986

STATEWIDE LONG-RANGE PLAN FOR THE MANAGEMENT OF THE WATER RESOURCES OF CONNECTICUT, PHASE I REPORT, 1971.
Connecticut Interagency Water Resources Planning Board, Hartford.

May 1971. 152 p, 54 fig, 27 tab, 4 append. HUD P-128.

Descriptors: *Planning, *Long-term planning, *Regional development, *Water resources development, Water supply, Water quality control, Flood control, Recreation, Water demand coordination, Environmental effects, Industrial water, *Connecticut, Urbanization.

The state of Connecticut is very concerned about the orderly development of its land and water resources and, in particular, the resolution of conflicts among various uses of its water resources such as for water supply, wastewater disposal, and recreation. This report, the initial findings of a comprehensive, statewide water resources planning program based on an act passed in 1967 (Public Act 477), is divided into four sections: (1) an introduction covering the background and organization of the study; (2) a description of various physical aspects of the state such as population, land use, climate, geology, and water resources; (3) an inventory of existing water resource uses and facilities including wastewater treatment facilities, water-based recreation, water supplies, industrial water use, and flood control structures; and (4) projections of future requirements for water uses, based on the Connecticut Interregional Planning Program's year 2000 projections. A glossary, a great number of maps and tables plus appendices on water quality standards and flood control protective devices are included. (Elfers-North Carolina)
W73-08987

LAND USE AND DEVELOPMENT ALONG THE TENNESSEE RIVER IN THE TARCOG REGION.
Top of Alabama Regional Council of Governments, Huntsville.

Technical Paper No. 4, April 1972. 21 p, map, 7 ref. CPA-AL-04-09-1006.

Descriptors: *Comprehensive planning, *Land use, Urbanization, Regional development, Coordination, Recreation, *Alabama, *Tennessee River.
Identifiers: *Shorelands, Land use trends, Land use conflicts, *TARCOG region (Alabama).

Urban development trends and planning recommendations for an area along the Tennessee River in northern Alabama are presented. The focus is on the land adjacent to the Tennessee River because of its overriding economic and recreational influence in the region. The purpose of the report is to create a public awareness of the potential conflicts among various uses of the land along the river and the need for comprehensive planning. An inventory of current uses along the river, a discussion of future trends in these uses and the potential conflicts, and some planning recommendations are included. At present the four main uses of riverfront land (industrial areas, residential subdivisions, recreational areas, and wildlife areas) are each concentrated in a single county. However, as industrial and residential areas continue to expand there will arise numerous conflicts without proper planning. The formulation of a regional development plan, the creation of strong county planning agencies, local coordination programs, and the increased use of the regional clearinghouse for review and coordination of development are recommended for optimal use of the land. (Elfers-North Carolina)
W73-08988

INCOG FUNCTIONAL PLAN SUPPLEMENTS (WATER AND SEWER, HOUSING AND OPEN SPACE).
Indian Nations Council of Governments, Tulsa, Okla.

Available from the National Technical Information Service as PB-213 156, $7.50 in paper copy, $1.45 in microfiche. Final report. June 1972. 99 p, 13 tab, append. CPA OK 06 56 1012.

Descriptors: *Planning, *Evaluation, *Water supply, *Sewerage, Legislation, Waste disposal, *Oklahoma.
Identifiers: *Plan review, Implementation, Policies, Capital improvements, *INCOG.

A review and update of three elements of the Indian Nations Council of Governments comprehensive plan is presented. The review is based upon the objective of maintaining the planning program as a continuing process. The water and sewer plan element was completed in 1970 and the first review and evaluation is described in Chapter II, p. 9-30. The review is conducted by the INCOG staff and the Water and Sewer Technical Advisory Committee. The review is organized into four areas: (1) plan effectiveness, which is measured largely in terms of whether recommended projects were either implemented or are in the design stage; (2) water and wastewater disposal policy analysis in which goals and implementation policies are reviewed and possibly changed; (3) legislative analysis of new federal acts and programs relevant to the plan; (4) and capital improvement program updating in which specific project proposals and priorities are reassessed. The review also includes a revised table of capital improvements for the next five years. (Elfers-North Carolina)
W73-08989

INTERIM RIVER REPORT, NOVEMBER 1970.
Interagency Riverfront Committee, Minneapolis, Minn. Design Team.

November 1970. 114 p, illus, 31 maps.

Descriptors: *City planning, *Community development, Aesthetics, Urban renewal, Railroads, Architecture, *Design, *Minnesota.
Identifiers: *Urban riverfront, *Minneapolis, *Mississippi River.

The interim report on the development opportunities for the Mississippi riverfront in Minneapolis is primarily intended to serve as a basis for community discussion and participation. It points out the importance of immediate action while there is great national interest in environmental quality and favorable local circumstances such as the planned merger of several railroads, the expansion of the University of Minnesota, and several existing redevelopment projects. The importance of community values and goals, the aesthetic and amenity potential of the riverfront, the special character of riverfront activities, and the design of riverfront buildings and land uses are stressed. Much of the report is devoted to suggesting design concepts for the various districts or distinctive areas along the river. The river is seen as a key element in the overall development of the city, particularly as a means to help integrate various areas and activities within the city. (Elfers-North Carolina)
W73-08990

ROLE OF WATER IN URBAN PLANNING AND MANAGEMENT,
Geological Survey, Arlington, Va. Water Resources Div.
For primary bibliographic entry see Field 04C.
W73-09082

6C. Cost Allocation, Cost Sharing, Pricing/Repayment

ROUGE RIVER FLOOD CONTROL PROJECT. SECTION B FROM I-94 TO MICHIGAN AVENUE ALTERNATIVE NO. IV (SUPPLE-

MENT TO FINAL ENVIRONMENTAL IMPACT STATEMENT).
For primary bibliographic entry see Field 08A.
W73-08681

POLLUTION CONTROL FINANCING IN THE UNITED KINGDON AND EUROPE,
Thames Conservancy, Reading (England).
For primary bibliographic entry see Field 05G.
W73-09005

OPTIMAL FAIL-SAFE PROCESS DESIGN,
Louis Koenig--Research, San Antonio, Tex.
For primary bibliographic entry see Field 05D.
W73-09006

THE ALLOCATION OF TROUBLESOME MATERIAL,
For primary bibliographic entry see Field 05G.
W73-09010

6D. Water Demand

AN ANALYTICAL INTERDISCIPLINARY EVALUATION OF THE UTILIZATION OF THE WATER RESOURCES OF THE RIO GRANDE IN NEW MEXICO,
New Mexico State Univ., University Park. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 06B.
W73-08458

THE FLOURISHING DISTRICT HEATING BUSINESS,
R. Schuster.
Power Engineering, Vol 75, No 9, p 34-39, September 1971. 2 fig.

Descriptors: *Heating, *Electric power demand, *Air pollution, Solid wastes, Thermal pollution, Electric power production, Heated water.
Identifiers: *Incineration, *District heating, Refuse.

District heating systems in the United States sold more than 81 billion pounds of steam in 1970, had revenues of $136 million, were serving almost 15,000 customers at the end of the year, and had an investment in steam plants and distribution piping systems of well over $300 million. Advantages of district heating include elimination of boilers, fire hazards and air pollution problems and negligible additional costs connected with expansion of steam demands. The business is also discussed from the standpoint of refuse burning for district heating boilers. Examples of district heating plants, some associated with electric power production, in Europe, Asia and the United States are cited. (Oleszkiewicz-Vanderbilt)
W73-08612

WHERE WILL NUCLEAR POWER BE IN 1980,
Bechtel Corporation, Michigan.
G. S. C. Wang.
Consulting Engineer, Vol 37, No 1, p 66-69, July 1971. 4 fig, 1 tab.

Descriptors: *Nuclear powerplants, *Electric power demand, *Environmental effects, Electric power production, Fossil fuels, Nuclear energy, Nuclear reactors, Legislation, Thermal pollution, Economics.

Nuclear energy and fossil fuel energy must continue to complement, not compete with, each other in the next decade to satisfactorily fulfill the total requirement for electrical energy. The projected 150,000 MWe of nuclear generating capacity to be operational by 1980 will require cooperation of industry, government and the public. Nuclear power plants must be located with equal emphasis on environmental design and the conventional design aspects of plant siting. Advanced technology environmental abatement systems must continue to be developed to assure man's requirement for electrical energy can be met while preserving or enhancing the environment. Advanced generation systems must continue to be developed and demonstrated during the '70s to assure economic energy generation in the decades ahead. (Oleszkiewicz-Vanderbilt)
W73-08613

METHODS FOR ENVIRONMENTAL PLANNING OF THE CALIFORNIA COASTLINE,
California Univ., Berkeley. Dept. of Landscape Architecture.
For primary bibliographic entry see Field 02L.
W73-08808

FUNCTIONAL WATER AND SEWERAGE PLAN AND PROGRAM, CATAWBA REGIONAL PLANNING COUNCIL.
LBC and W Associates, Columbia, S.C.
For primary bibliographic entry see Field 06B.
W73-08977

WATER SUPPLY PLAN FOR THE SOUTHEASTERN CONNECTICUT REGION, VOLUME I, INVENTORY.
Southeastern Connecticut Water Authority, Norwich.
For primary bibliographic entry see Field 06B.
W73-08986

STATEWIDE LONG-RANGE PLAN FOR THE MANAGEMENT OF THE WATER RESOURCES OF CONNECTICUT, PHASE I REPORT, 1971.
Connecticut Interagency Water Resources Planning Board, Hartford.
For primary bibliographic entry see Field 06B.
W73-08987

6E. Water Law and Institutions

AN EXAMINATION OF THE ECONOMIC IMPACT OF POLLUTION CONTROL UPON GEORGIA'S WATER-USING INDUSTRIES,
Georgia Inst. of Tech., Atlanta. Engineering Experiment Station.
For primary bibliographic entry see Field 05G.
W73-08453

ORGANIZATION OF LAND AREA IN WASHINGTON FOR WATER AND LAND USE PLANNING,
Washington State Univ., Pullman. Dept. of Agronomy and Soils.
W. A. Starr.
Available from the National Technical Information Service as PB-219 983, $3.00 in paper copy, $1.45 in microfiche. Washington Water Research Center, Pullman, Report no. 12, November 1973. 97 p, 7 fig, 13 tab, 14 ref, 3 append. OWRR A-051-WASH (1).

Descriptors: *Planning, *Land use, *Management, *Washington, *Land tenure, *Local governments, Institutions, Organizations, Water policy.

Three levels of planning and management units for the state of Washington have been examined. They are the Land and Water Management Region, the Watershed, and the Local Planning (hydrologic) Unit. An evaluation of the distribution of land and water resources was made at each level of planning and related to the distribution of ownership of the land. The king and number of local improvement and public purpose districts were also associated with the planning units. Eleven Land and Water Management Regions and 87 Watersheds were considered. They were compared with regions and watersheds identified in other planning concepts and public action programs. Their utility for planning, administration, and regulatory functions were evaluated. The use of Local Planning (hydrologic) Units was evaluated and a method for construction of local units within a watershed developed. The utility of the local units for local analysis of land and water problems and developments, for land and water plan integration, and as a means of involvement of local people in the planning process have been considered.
W73-08607

UTILITY BATTLES: YOU CAN'T WIN 'EM ALL.
For primary bibliographic entry see Field 05G.
W73-08622

MOBILIZING FOR A CLEAN ENVIRONMENT: WHO SHOULD BE DOING WHAT, HOW AND WHY,
L. R. Freeman.
In: Water Resources Seminar Series No 1, January 1972. Water Resources Research Center, University of Hawaii, Honolulu, p 27-36.

Descriptors: *Environment, *Comprehensive planning, *Governments, *Pollution abatement, Decision making, Institutions, Social aspects, Industry, Air environment, Aquatic environment, Hawaii.

The goal is to better understand the nature of the system within which we are striving for a better environment. The federal government recommends broad, general policy and general means for implementing that policy; the state augments and interprets general policy and translates this into a broadly defined plan of action, and finally, local government and industry are made responsible for taking action to abate pollution. Accomplishing the goal of 'protection and enhancement' of the environment requires two principal actions--one is the abatement of existing problems, and the other is prevention of future problems; a third category is program support activities, such as surveillance, systems analysis, etc. The most dramatic example of preventing future problems is the 'environmental impact statement'. Two widely divergent approaches are possible in dealing with the mechanics of administering a pollution control program. The problem approach focuses on identifying problems and dealing with them. Pollution prevention characteristically focuses on planning or analyses designed to forecast future problem areas and to head these problems off. An alternative approach is to focus on action requirements which is based on the observation that many problems can be prevented or controlled by controlling the cause. (Auen-Wisconsin)
W73-08649

A SLOW AND PAINFUL PROGRESS TOWARDS MEETING OUR WATER POLLUTION CONTROL GOALS,
S. Soneda.
In: Water Resources Seminar Series No 1, January 1972. Water Resources Research Center, University of Hawaii, Honolulu, p 39-41.

Descriptors: *Water pollution control, *Hawaii, *Regulation, Pollutant identification, Legal aspects, Water quality standards, Water policy, State governments, Management, Tariff.
Identifiers: Mixing zone.

Chapter 37-A of Hawaii's Public Health Regulations classifies the state waters in accordance with the uses to be protected and delineates basic water quality standards applicable to all water areas and

specific standards applicable, depending upon the water area classification. Due to the stringency of the standards a provision was made for a limited zone of mixing for the assimilation of waste discharges which were first required to be subjected to 'the best practicable treatment or control or such lesser degree of treatment or control as will provide for a water quality commensurate with the classified use of the waters outside the zone of mixing'. Recently the regulation has been changed to read 'the best practicable treatment or control'. Those involved considered the term 'best practicable' as including an economic consideration; others are now insisting that this term sould read as 'the best state of the art', exclusive of economic considerations. As Hawaii is committing its financial resources to back the construction of water pollution control facilities, it should consider the next, logical step--the utility business: that part of the business dealing with the treatment-resource recover-disposal of waste water as the primary mechanism to control pollution. (Auen-Wisconsin)
W73-08650

WATER QUALITY IN A STRESSED ENVIRONMENT, READINGS IN ENVIRONMENTAL HYDROLOGY.
For primary bibliographic entry see Field 05G.
W73-08662

COMMENTARY: FILLING AND DREDGING IN MICHIGAN--SOME FURTHER THOUGHTS,
Wayne State Univ., Detroit, Mich.
R. W. Bartke.
Wayne Law Review, Vol 18, p 1515-1526, 1972. 51 ref.

Descriptors: *Judical decisions, *Public rights, *Riparian land, *Riparian rights, *Dredging, Eminent domain, Riparian waters, Navigable waters, Michigan, Highway effects, Construction, Environmental control, Water policy, Law enforcement, Non-navigable waters, Ownership of beds, Environmental effects.
Identifiers: Standing, Injunctions (Prohibitory), Estoppel, Public trust doctrine, Navigability tests, Fill permits.

This comment is an extension and continuation of an earlier note in this Review. The addition has become necessary due to several significant judicial decisions since the first article. Of particular concern is the effect that dredge and fill operations may have upon privately owned lakes and waters adjoining riparian land. The avenues of relief open to such landowners are discussed in detail in connection with recent decisions by the Supreme Courts of Michigan and the United States. The decisions are very dissatisfying because too much emphasis was placed upon navigability of the waters and the public's right to use than upon the crucial concern of the effect of filling and dredging upon the lakes' natural conditions. Numerous legal remedies are available, including injunctions and claims for estoppel. If riparian landowners themselves wish to fill land they should not be automatically permitted to do so since the title they obtain is burdened by a public trust. Bold action on all fronts, legislative, administrative and judicial, is needed to meet the ecological crisis. (Smith-Adam-Florida)
W73-08665

ENVIRONMENTAL IMPACT STATEMENTS--A DUTY OF INDEPENDENT INVESTIGATION BY FEDERAL AGENCIES.
For primary bibliographic entry see Field 06G.
W73-08666

HEARING FOR THE REVIEW AND REVISION OF MISSOURI'S WATER QUALITY STANDARDS.
Missouri Clean Water Commission, Jefferson City.
For primary bibliographic entry see Field 05G.
W73-08668

FEDERAL DECISIONMAKING FOR WATER RESOURCE DEVELOPMENT, IMPACT OF ALTERNATIVE FEDERAL DECISION-MAKING STRUCTURES FOR WATER RESOURCES DEVELOPMENT,
Michigan State Univ., East Lansing. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 06B.
W73-08669

WATER SUPPLIES.
For primary bibliographic entry see Field 05G.
W73-08670

HYDROPNEUMATIC STORAGE FACILITIES.
Illinois State Environmental Protection Agency, Springfield. Div. of Public Water Supplies.
For primary bibliographic entry see Field 05G.
W73-08671

LIMESTONE POLICY.
Illinois State Environmental Protection Agency, Springfield. Div. of Public Water Supplies.
For primary bibliographic entry see Field 05G.
W73-08672

LEGISLATIVE NEEDS IN WATER RESOURCES MANAGEMENT IN ALABAMA,
Alabama Univ., University. Natural Resources Center.
D. M. Grubbs, and H. Cohen.
Available from National Technical Information Service, U.S. Department of Commerce as PB-211 121. Price: $3.00 in paper copy, $1.45 in microfiche. Report prepared for Alabama Development Office, November 1971. 86 p, 82 ref.

Descriptors: *Alabama, *Water management (Applied), *Water resources development, *Water allocation (Policy), *State jurisdiction, *Legislation, Water supply development, Water quality standards, Alternative water use, Water conservation, Water rights, Water law, Legal aspects, Administrative agencies, Governmental interrelations, Riparian rights, Potential water supply, Marshland management, Groundwater resources, Flood plain zoning, Eminent domain, Constitutional law, Planning.
Identifiers: Coastal waters, New York Conservation Law.

This study identifies legislative action needed in the planning methodology to place responsibility and authority in the hands of Alabama state agencies charged with development and conservation of water resources. The dilemma in water supply and water use is discussed with particular emphasis on problems of riparian rights, groundwater use, diffused surface water, control of watercourses, and conflicting claims and rights to water in Alabama. Alternative legislative measures of various states are outlined. Finally, there is a proposed plan of legislative action for long-range development of Alabama's water resources divided into interim legislative needs, primarily concerning conservation and pollution control, and legislation requiring a constitutional amendment aimed at establishing priorities in water use. Legislative action has now become critical to the formulation of long-range plans for the development and management of Alabama's water resources. (Dunham-Florida)
W73-08674

CALIFORNIA LAWYERS LEAD ENVIRONMENTAL FIGHT,
J. Adler.
Juris Doctor, p 23, February 1973. 1 p, 1 fig.

Descriptors: *California, *Legal aspects, *Pollution control, *Legislation, Administrative decisions, Regulation, Institutions, Public rights, Environmental effects, Conservation, Resources, Natural resources, Land use, Land development, Air pollution, Coasts.
Identifiers: Coastal zone management.

California is the scene of a great deal of environmental law activity, which may well preview that to come in other states. At the polls in November, environmentalists stunned the large oil, land and utility interests with the passage of the Coastal Initiative, which creates regional commissioners to draw up long range plans for the conservation of the coastline. Even the most conservative state legislators are concerned about air emmissions, and drastic steps may be politically feasible. Land use planning is another matter, however, and environmentalists and developers are gearing up for a fight over this element of conservation. Despite intense lobbying, the Environmental Quality Act was passed virtually intact. This provided that decisions by local officials on building and conditional use permits and zoning variances for private construction require environmental impact statements. (Glickman-Florida)
W73-08675

NEW ENGLAND RIVER BASINS COMMISSION--1972 ANNUAL REPORT.
New England River Basins Commission, Boston, Mass.

Report 1972. 36 p, 6 fig, 1 map, 13 photo, 1 chart, 4 append.

Descriptors: *New England, *River basins, *River basin development, *River basin commissions, *Comprehensive planning, Offshore platforms, Water resources, Water resources development, Water management (Applied), Water resources Planning Act, Intergovernmental relations, Oil pollution, Connecticut River, Regional analysis.

Under the Water Resources Planning Act, the New England River Basins Commission serves as the principal agency in its region for the coordination of plans for the use and development of water and related land resources. Results are presented of special studies carried out with reference to Boston Harbor, hydroelectric power, offshore oil, and the Nashua River as well as a comprehensive analysis of the northern states' guide plan program. In addition, an analysis of three separate comprehensive planning programs for water and related land resources is discussed. During 1972, four Connecticut River Basin states and federal agencies approved a comprehensive plan for management of the water and related land resources of the basin through 1980. Significant progress was also made toward developing comprehensive programs for protection and management of water and related land resources in southeastern New England and Long Island Sound. Detailed analyses of specific resource conditions and needs were undertaken in both areas as a basis for formulating preservation, development and management programs. Illustrations, graphs, charts, and the Commission's annual financial statement are also included. (Mockler-Florida)
W73-08676

CITIZEN ALERT: PUBLIC PARTICIPATION IN THE FEDERAL WATER POLLUTION CONTROL ACT AMENDMENTS OF 1972.
Natural Resources Defense Council, Washington, D.C.
For primary bibliographic entry see Field 05G.
W73-08677

PUBLIC PARTICIPATION IN WATER POLLUTION CONTROL PROGRAMS.

Federal Register, Vol 38, No 36, February 23, 1973. 2 p. Proposed Code of Federal Regulations, Ch. 40 secs 105.1 thru 105.8.

Descriptors: *Federal Water Pollution Control Act, *Administrative decisions, *Adjudication procedure, *Environmental control, Legal aspects, Administrative agencies, Standards, Water pollution control, Decision making, Legislation, Law enforcement, Federal government, State governments.
Identifiers: Public hearings.

These proposed regulations specify minimum guidelines for public participation in certain processes under the Federal Water Pollution Control Act Amendments of 1972. Proposed by the Environmental Protection Agency, the regulations set forth policy and objectives in regard to public participation, describe the provisions required in a minimum public participation program at state and federal levels of governmental activity for water pollution control, call for a report on public participation efforts in relation to certain actions, and give minimum procedural guidelines for public hearings. The proposed public participation regulations have been developed with informal participation of and suggestions from numerous persons, including representatives of several citizen and conservation groups, trade organizations, governments, and other interests. The states have had an opportunity to comment on the proposed regulations in draft form. Prior to the adoption of the proposed regulations, consideration will be given to comments, suggestions, or objections which may be submitted in writing to the Environmental Protection Agency. (Mockler-Florida)
W73-08678

A VETERAN VIEWS THE POLLUTION FIGHT,
For primary bibliographic entry see Field 05G.
W73-08679

WILDERNESS SOCIETY V. MORTON (INJUNCTIVE RELIEF SOUGHT AGAINST THE ISSUANCE OF LAND USE PERMIT FOR CONSTRUCTION PURPOSES ON THE TRANS--ALASKAN PIPELINE PROJECT).

3 ELR 20085-20120 (D.C. Cir. February 9, 1973).

Descriptors: *Alaska, *Oil fields, *Pipelines, *Environmental effects, Governmental interrelations, Legislation, Administrative agencies, Judicial decisions, Legal aspects, Legal review, Land use, Permits, Planning, Governments, Ecology, Natural resources, Natural gas, Oil pollution, Water pollution sources, Water pollution, Federal government, Project planning, Public lands, Canada.
Identifiers: *Mineral Leasing Act, *National Environmental Policy Act, Environmental Impact Statements, Injunctions (Prohibitory), Ripeness, Department of the Interior, Trans-Alaskan Pipeline Project.

Appellants, environmental protection groups, sought an injunction against appellee, Secretary of the Interior, from issuing permits for construction purposes on the Trans-Alaska Pipeline Project. Following the discovery of a major oil field in Alaska, several oil companies developed plans to transport the oil to markets in the U.S. by way of a pipeline crossing U.S. owned lands. The companies sought permits from the Department of the Interior, and appellee announced his decision to grant them. Appellants contended issuance of the permits would violate provisions of the Mineral Leasing Act (MLA) by exceeding width limitations and that issuance would violate the National Environmental Policy Act (NEPA) in that the Environmental Impact Statement fails adequately to consider alternative routes through Canada. Appellee denied both contentions. The U.S. Supreme Court held that the grant of a right-of-way of 200 feet on either side of the pipeline violates MLA which only authorizes 25 feet. The court refused to reach claims under NEPA concluding they were not yet ripe for adjudication. The Court instructed the District Court to enter a decree enjoining appellee from issuing permits inconsistent with MLA restrictions. (Dunham-Florida)
W73-08693

DALY V. VOLPE (ENVIRONMENTAL STUDIES REQUIRED FOR HIGHWAY CONSTRUCTION).

250 F. Supp. 252-261 (W. D. Wash. 1972).

Descriptors: *Washington, *Administrative decisions, *Legal review, *Highway effects, *Environmental effects, Judicial decisions, Highways, Legal aspects, Road construction, Environmental control, Decision making, Federal project policy, Wildlife habitats, Marsh management.
Identifiers: *National Environmental Policy Act, *Environmental Impact Statements, Federal Aid Highway Act.

Plaintiffs, residents and landowners, sued to enjoin the construction of a federally funded highway by defendants, government officials. The highway was to go through a wildlife and waterfowl refuge which was privately owned. Plaintiffs maintained that the construction would violate the Federal Aid Highway Act, since dfendants failed to make required environmental findings prior to routing a federal aid highway through a wildlife and waterfowl refuge, and the National Environmental Policy Act (NEPA) because the enivronmental impact statement was inadequate. The U.S. District Court held: (1) the Federal Aid Highway Act is not violated since the wildlife, waterfowl refuge is privately and not publicly owned; (2) that NEPA is applicable to federal aid highway projects; and (3) the NEPA has been violated because the planning report inadequately discussed the adverse environmental effects construction would have upon the wildlife, waterfowl refuge. The court therefore enjoined further construction until an environmental impact statement was filed which met the NEPA required procedural and substantive requisites. (Mockler-Florida)
W73-08694

UNITED STATES V. GRANITE STATE PACKING COMPANY (VIOLATION OF REFUSE ACT OF 1899).

470 F.2d 303-304 (1st Cir. 1972).

Descriptors: *Rivers and Harbors Act, *Water pollution sources, *United States, *Sewage effluents, New Hampshire, Navigable rivers, Legislation, Culverts, Open channels, Water pollution, Industrial wastes, Organic wastes, Environmental sanitation, Local governments, Municipal wastes, Sewage, Environmental effects, Judicial decisions, Legal aspects, Watercourses (Legal aspects), Permits.
Identifiers: *Refuse Act.

Defendant meat packing firm appeals from prosecution for violating the Refuse Act of 1899 brought by the United States government. Appellant's predecessor in occupation constructed a stone culvert to carry away waste discharges. Later, the city connected a sewer to the culvert. Since then appellant and the city have discharged effluents which mingle in the culvert and flow into the Merrimack River, a navigable river covered by the Refuse Act. Appellant contended that the city's extended use of the culvert made it a part of the city's sewer system and that appellant is therefore freed of its liability. The United States Court of Appeals, First Circuit, held that if a party deposits an impermissible substance in a municipal sewer, knowing that the sewer leads directly into navigable water, it causes, suffers, or procures the substance to be discharged into the stream. Moreover, the statute is not restricted to direct deposits. The fact that the Refuse Act empowers the Secretary of the Army to grant exceptions does not aid appellant's argument because the statute makes receipt of a permit a condition precedent to relieve liability from the statutory prohibition. (Dunham-Florida)
W73-08695

BANKERS LIFE AND CASUALTY COMPANY V. VILLAGE OF NORTH PALM BEACH, FLORIDA (SUIT BY RIPARIAN LANDOWNERS TO COMPEL CORPS OF ENGINEERS TO RENEW DREDGE AND FILL PERMITS).

469 F.2d 994 (5th Cir. 1972).

Descriptors: *United States, *Administrative decisions, *Riparian rights, *Permits, Administrative agencies, Water law, Legal aspects, Legislation, Navigable waters, Water conservation, Lakes, Lake shores, Dredging, Environmental effects, Land development, Governmental interrelations, Judicial decisions, State governments, Legal review.
Identifiers: *Army Corps of Engineers, National Environmental Policy Act, Fish and Wildlife Coordination Act, Fill permits.

Plaintiff riparian landowner sued the defendant, Army Corps of Engineers, to compel renewal or issuance of a new dredge and fil. permit. The defendant refused to renew the permit so long as an objection was filed by a state agency involved. It also refused to issue the permit on ecological grounds. Plaintiff maintained that the objection by the state agency was not binding on appellants and since permit criteria did not include ecological considerations when the original permit was issued, such criteria should not be considered now. The United States Court of Appeals held that, where plaintiff waited over five years to object to appellant's denial of an extension, he was in no position to complain if, during such period, requirements for issuance of a permit became more stringent concerning the effect on the environment. The court further held that the Corps could not be kept from complying with subsequent requirements merely because of their stating to plaintiff that an extension of the permit would be granted upon withdrawal of a deferral request by the state agency involved. Finally, the court held that defendant properly denied the permit when so requested by a concerned state agency. (Dunham-Florida)
W73-08696

COWELL V. COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF TRANSPORTATION (CHALLENGE TO CONDEMNATION PROCEEDINGS INSTITUTED TO PROVIDE CHANNEL IMPROVEMENT).

297 A.2d 529 (Commonwealth Ct. Pa. 1972).

Descriptors: *Pennsylvania, *Eminent domain, *Drainage programs, *Environmental effects, Legal aspects, Judicial decisions, Condemnation, Administrative agencies, Channel improvement, Water pollution, Flood control , Erosion control, Highway effects, Legal review.
Identifiers: Clean Streams Act (Pennsylvania), Administrative Code Act (Pennsylvania).

Plaintiff-condemnee sought to prevent a taking of a portion of her land by eminent domain to improve a highway drainage channel. The channel, arising on one side of the highway, carried water through a pipe beneath the highway and then across plaintiff's land and into a creek. The defendant, highway department, contended that additional condemnation of plaintiff's land was necessary to provide an improved channel resulting in

better protection of the highway from flooding and erosion. Plaintiff contended that defendant failed to comply with Pennsylvania's Administrative Code Act (ACA) requiring an environmental effect report and hearing; that there was no proper public purpose for taking; and that the project contravenes policies set forth in Pennsylvania's Clean Streams Law. The Commonwealth Court of Pennsylvania found: (1) the project did not constitute a transportation route or program within the meaning of the ACA, (2) evidence of continued flooding and erosion unless the channel was altered was a sufficient public purpose, and (3) evidence that the commonwealth had not caused existing pollution indicated the project did not contravene the Clean Streams Law. (Dunham-Florida)
W73-08697

UNITED STATES V. 100 ACRES OF LAND, MORE OR LESS, IN MARIN COUNTY, STATE OF CALIFORNIA (TITLE DISPUTE INVOLVED IN FEDERAL CONDEMNATION PROCEEDINGS OF SMALL PENINSULA).

468 F.2d 1261 (9th Cir. 1972).

Descriptors: *United States, *Boundaries (Property), *Condemnation, *High water mark, Sand spit, Tidal effects, Water levels, Pacific Coast Region, Water law, boundary disputes, Seashores, Sea level, Sand bars, Real property, Legal aspects, Condemnation value, Judicial decisions, Islands, Meanders, Patents, Surveys.

Condemnee landowner claimed title to a small peninsula on the coast of California and sought compensation from the United States government in this federal eminent domain proceeding. The government conceded that appellee was successor in interest to the peninsula, but contended that the parcel of land in question was a small offshore island, and that at the time of the original government patent it was not within the high tide line of the condemnee's land. The government argued the patent was granted only to a portion of the peninsula and that the land in question belonged to the United States, and therefore the United States did not own compensation to appellee. The United States Court of Appeals, Ninth Circuit, held that on consideration of the entire record there was ample evidence to support the findings and conclusions of the trial court including the fact that appellee did possess title to the land in question. (Dunham-Florida)
W73-08698

CHARLES COUNTY SANITARY DISTRICT, INC. V. CHARLES UTILITIES, INC. (ACTION BY WATER AND SEWER CORPORATION SEEKING JUDICIAL VALIDATION OF IT FRANCHISE).
298 A.2d 419 (Ct. App. Md.1973).

Descriptors: *Maryland, *Sewage districts, *Judicial decisions, Sewage treatment, Legal aspects, Governments, Sewage disposal, Liquid wastes, Waste water treatment, Water pollution, Treatment facilities, Administrative agencies.

This case involved an action brought by the complainant water and sewer corporation seeking declaratory and injunctive relief against a sanitary district which refused to recognize or give its approval to a water and sanitary district franchise to the corporation beyond the boundaries of a certain area. The main issue of the case was whether a franchise had already been indirectly granted. The court held that the state tax commission's acceptance of the incorporation papers and the amendments thereto stating the corporation's purpose of operating a water and sewerage system did not constitute the grant of a franchise to the corporation. The court emphasized the granting of a franchise is a legislative function and that the public service commission did not have such authority. Moreover, the court also indicated an order of the state department of health ordering several commercial establishments to hook up to the sewer and water corporation's facilities did not constitute the grant of a franchise to the corporation. (Mockler-Florida)
W73-08699

EXCHANGE NATIONAL BANK OF CHICAGO V. BEHREL (CITY NOT REQUIRED TO SUPPLY WATER TO LANDOWNER).
292 N.E.2d 164 (Ct. App. Ill. 1972).

Descriptors: *Illinois, *Judicial decisions, *Water supply, *Water rights, Legal aspects, Permits, Water utilization, Water policy, Competing uses, Local governments, Water delivery, Water distribution (Applied), Municipal water.

This case involved a declaratory judgment proceeding instituted by plaintiff landowner against the defendant city concerning whether the city was required to supply water to the plaintiff. Previously, the municipality had entered into a contract with an improvement association to supply water. This contract provided that no other parties were allowed to connect to the water main without the joint consent of the parties to the contract. Subsequently, plaintiff's predecessor in title paid the required amount to tap into the water main and was allowed to do so. When plaintiff acquired the property he paid the necessary amount to continue the water rights but the city refused to grant the requested permission. The appeals court affirmed the lower court and held the municipality was within its discretion in refusing to allow plaintiff to tap into the water main. (Mockler-Florida)
W73-08700

TAKING OYSTERS FROM BROADKILN, MISPILLION OR MURDERKILL RIVERS OR THEIR TRIBUTARIES.
Del. Code Ann. tit. 7, secs 2131 thru 2134 (Supp. 1970).

Descriptors: *Delaware, *Commercial fishing, *Oysters, *Legislation, Shellfish farming, Aquatic animals, Aquatic life, Commercial shellfish, Invertebrates, Marine animals, Shellfish, Mollusks, Aquiculture, Industries, Ecology, Environmental effects, Governments, Water resources development, Water law, Administration, Regulation.
Identifiers: Broadkiln River, Mispillion River, Murderkill River, Del.

No oysters less than three inches in length shall be taken from the Broadkiln River or its tributaries, and all oysters taken shall be culled in the stream of water of at least two feet deep at mean low water. Oysters used solely for planting purposes are excepted from this provision. A limit of 25 bushels from the Broadkiln or its tributaries, and a limit of 15 bushels of oysters from the Mispillion and Murderkill Rivers per boat per day is imposed with an allowance of 20% of the total catch made for waste. Taking of oysters from the three rivers and their tributaries is limited to a period between September first and the following March thirty-first. The State Board of Health may permit oysters to be taken from the Broadkiln River for seeding purposes only in home waters. Seed oysters may not be taken from the Mispillion or Murderkill Rivers or their tributaries. (Dunham-Florida)
W73-08701

CRABS AND CLAMS.

Del. Code Ann. tit. 7, secs. 2301 thru 2306 (Supp. 1970).

Descriptors: *Delaware, *Commercial fishing, *Legislation, *Crabs, *Clams, Delaware River, Conservation, Protection, Wildlife conservation, Aquatic animals, Aquatic life, Commercial shellfish, Invertebrates, Shellfish, Mollusks, Aquiculture, Marine animals, Ecology, Environmental effects, Governments, Water resources development, Water law, Administration, Regulation.
Identifiers: Hard-shell crabs, Soft-shell crabs, Peeler crabs, Big Assawoman Bay.

Sections 2301-2306, Title 7, Delaware Code Annotated, provide that no person shall take any female crabs bearing eggs or any female crab from which the egg pouch or bunion has been removed. Except as otherwise provided, any U.S. citizen may take hard shell crabs of not less than four inches in any of the state's tidal waters without a license. A non-resident is limited to 50 crabs and may not use more than four hand lines. Taking of hard shell crabs for commercial purposes is limited to the Delaware River and Bay and Big Assawoman Bay, and no person shall have in his possession more than 1 bushel of hard shell crabs, other than peeler crabs, less than 5 inches across. The taking of soft shell or peeler crabs is limited to the same areas with a 3 1/2 inch minimum for soft shell crabs and a 3 inch minimum for peelers. Persons operating boats using a dredge or rake must be licensed. It is unlawful to take crabs by dredge from March 16 to December 15 of any year. No person shall take any clams in Rehoboth Bay or Indian River Bay by motor powered devices or hauled by a boat propelled by motor power. (Dunham-Florida)
W73-08702

LOBSTERS.

Del. Code Ann. tit. 7, secs 2501 thru 2504 (Supp. 1970).

Descriptors: *Delaware, *Commercial fishing, *Legislation, *Lobsters, Crustaceans, Conservation, Protection, Wildlife conservation, Aquatic animals, Aquatic life, Commercial shellfish, Invertebrates, Shellfish, Shellfish farming, Aquiculture, Marine animals, Ecology, Environmental effects, Governments, Water resources development, Water law, Administration, Regulation.
Identifiers: Lobster pot.

No person shall take or attempt to take lobsters from the waters of Delaware between September first of each year and the last day of the following April, or between the hours of 2 p.m. every Saturday and 12 midnight of the following Sunday. No person may take lobsters other than by a lobster pot, trap or set; and each person is limited to not more than 50 such devices at one time. Lobsters measuring less than 3 1/8 inches or any spawning lobsters may not be taken from the public waters of the state; and lobsters less than the minimum length, whether caught within state jurisdictional limits or not, may not be possessed or offered for sale. Lobsters of any kind may not be taken from state waters by non-residents or aliens. Penalties for violation of these provisions are provided. (Dunham-Florida)
W73-08703

SOIL AND WATER CONSERVATION COMMISSION AND DISTRICTS.

Del. Code Ann. tit. 7 secs. 3901 thru 3912 (Supp. 1970).

Descriptors: *Delaware, *Legislation, *Soil conservation, *Water resources development, Land management, Land resources, Land use, Natural resources, Water resources, Water law, Water rights, Water quality, Water pollution, Water management (Applied), Water pollution control, Ecology, Environmental effects, Governments, Administration, Administrative agencies, Regulation, Water districts, Conservation.

It is the policy of the state of Delaware to provide for the preservation of the productive power of land and the optimum development and use of water resources by furthering conservation and development of these resources. The Department of Natural Resources and Environmental Control (DNREC) is charged with maintaining soil and water conservation districts in furtherance of this policy. For each district there shall be a Board of Supervisors composed primarily of elected members for a term of four years. Each district shall constitute a governmental subdivision of the state and the Board of Supervisors shall have enumerated powers for the administration and direction of the programs within their district. The Water and Air Resources Commission and DNREC shall have paramount jurisdiction over water use in this state. Any owner of land aggrieved by the actions of DNREC may appeal the results of required public hearings to the Superior Court within 30 days from the date of the hearing. (Dunham-Florida)
W73-08704

BOOTH V. CORN PRODUCTS CO. (TAXPAYER'S SUIT FOR RECOVERY OF COSTS OF TREATING EXCESS WASTES).
292 N.E.2d 149 (Ct. App. Ill. 1972).

Descriptors: *Illinois, *Waste treatment, *Judicial decisions, *Sewage districts, *Water pollution control, Waste water control, Legal aspects, Waste disposal, Environmental sanitation, Water pollution sources, Industrial wastes, Local governments, Legislation.

Plaintiff taxpayers sued derivatively on behalf of a municipal sanitary district against defendant manufacturers seeking to recover the costs of treating excess wastes of these companies. An ordinance limited the amount of wastes that any industrial plant could discharge into the sanitary district's sewers. The plaintiffs contended that the defendants had been unjustly enriched through their alleged unlawful acts of dumping excess waste water into the Sanitary District's sewer system to the detriment of all taxpayers, in that the cost of treating defendants' unlawful dumping resulted in less funds to expend on the Sanitary District's legitimate needs and a greater tax burden on the taxpayer, including plaintiffs, residing in the district. The court held the taxpayers, suing derivatively on behalf of the district, lacked the right to seek compensation from the two companies. Moreover, the appeals court held that the ordinance did not give the sanitary district the right to seek compensation for handling the excess discharge in the absence of a provision specifically providing for compensation. (Mockler-Florida)
W73-08705

ENVIRONMENTAL DEFENSE FUND, INC. V. ARMSTRONG (ACTION FOR INJUNCTIVE AND OTHER RELIEF WITH RESPECT TO THE NEW MELONES DAM PROJECT).
352 F. Supp. 50-61 (N.D. Cal. 1972).

Descriptors: *California, *Dam construction, *Federal project policy, *Governmental interrelations, *Environmental effects, Ecology, Water pollution, Navigable rivers, Dams, Damsites, Earth dams, Excavation, Project purposes, Federal government, Administrative agencies, Federal Reclamation Law, Legal aspects, Judicial decisions.
Identifiers: *National Environmental Policy, *Environmental Impact Statements, Injunctions (Prohibitory), Environmental protection groups, New Melones Dam, California Water Code, Stanislaus River.

Appellants, environmental protection groups, sought to enjoin the letting of bids and further construction on the proposed New Melones Dam, a federal project, across the Stanislaus River in northern California. The project will create the second largest earth and rock-filled dam in the United States. The appellants contended that the appellees, representatives of the U.S. government, have failed to comply with the provisions of the National Environmental Policy Act (NEPA) requiring an environmental impact statement (EIS), and that they have failed to obtain permits from the proper California agency as required by the California Water Code. The government denied both contentions. The United States District Court held that although the EIS required further supplementation to deal with alternatives to uses which the conservation yield might be put, balancing of the equities required that commencement of construction of the dam not be preliminarily enjoined pending preparation of the supplemented EIS. The court also held that federal agencies were required to obtain proper permits under the California Water Code, and that appellees should apply for the permits prior to the preparation of the NEPA statement. (Dunham-Florida)
W73-08706

YELLEN V. HICKEL (SUIT TO COMPEL ENFORCEMENT OF THE RECLAMATION LAW).

352 F.Supp. 1300-1319 (S.D. Cal. 1972).

Descriptors: *United States, *Judicial decisions, *Federal Reclamation Law, *Land development, *Water control, Legal aspects, Water utilization, Competing uses, Water loss, Water supply, Legislation, Water rights, Irrigation districts.

Plaintiff landowners sought a writ of mandamus to compel the Secretary of the Interior to enforce the Reclamation Law of 1902, which provides that no right to use water for land in private ownership shall be sold for a tract exceeding 160 acres to any one landowner, and no such sale shall be made to any one landowner unless he be an actual bona fide resident thereon. The court held that the Reclamation Law Section was applicable to a contract between an irrigation district and the federal government whereby the district agreed to repay the construction costs of a project, despite the contention of nonapplicability because there was no sale and because a district rather than individual landowners was involved. Moreover the court held this section does not limit residency to the threshold requirement and that a water right can validly be conditioned upon continued residence. In addition, this section of the 1902 Reclamation Law was applicable despite application of the Boulder Canyon Project Act. (Mockler-Florida)
W73-08707

BELLE FOURCHE IRRIGATION DISTRICT V. SMILEY (ACTION TO RESTRAIN RIPARIAN OWNER FROM DIVERTING WATER).
204 N.W.2d 105 (So. Dak. 1973).

Descriptors: *Water rights, *South Dakota, *Water law, *Riparian rights, Prior appropriation, Legal aspects, Judicial decisions, Legislation, Alteration of flow, Diversion, Domestic water, Civil law, Irrigation water, Water policy, Riparian land, Prescriptive rights, Eminent domain, Beneficial use, Water utilization.

Plaintiff irrigation district sought to restrain the defendant riparian landowner from diverting water from a river for irrigation purposes. The defendant contended that he had a vested riparian right to use and divert water for domestic and irrigation purposes by virtue of his ownership of land contiguous to the river, and that right he asserted, became an inseparable incident of the land; to deny him such right deprived him of property without just compensation and due process of law. The South Dakota Supreme Court held for the plaintiff because of a comprehensive water law enacted in 1955. The act limited the riparian doctrine to accrued rights thereunder. Thus, mere ownership of land contiguous to a stream did not carry with it a vested right to divert unlimited amounts of water. There had to be appropriation and application to a beneficial use, and that measure of use was the amount of water divertable by a riparian owner for irrigation. Defendant was allowed to divert water for domestic purposes. (Glickman-Florida)
W73-08708

CARPENTIER V. ELLIS (LANDOWNER'S RIGHT TO LATERAL SUPPORT).
489 S.W.2d 388 (Ct. Civ. App. Texas 1973).

Descriptors: *Texas, *Water law, *Judicial decisions, *Negligence, *Adjacent landowners, Structures, Legal aspects, Water policy, Accidents, Risks, Wave action, Shore protection, Soils, Retaining walls, Abutments, Bulkheads.

Plaintiffs and defendants were landowners of adjacent lots on a lake that was not filled in until after each had purchased his lot. Plaintiffs constructed a bulkhead in front of their lot on the lake side, and later defendants likewise built a retaining wall that abutted plaintiffs. As the lake filled, wave action caused defendants' retaining wall to collapse, and plaintiffs alleged that because of the loss of lateral support, damage was caused to their wall. Plaintiffs contended that defendants owed them a duty of lateral support, and sought injunctive relief to compel defendants to contruct a proper retaining wall as well as money damages. The appellate court held for the defendants, stating that although an owner of land had an absolute right to the lateral support of adjoining land, this applied only to soil and not to buildings or other structures placed upon the land. As to the latter, it was essential to show negligence to recover. Plaintiffs made no allegations or proof of negligence, and thus could not obtain relief. (Glickman-Florida)
W73-08709

AYERS V. TOMRICH CORPORATION (LIABILITY FOR ALTERATION OF SURFACE RUNOFF FLOW).
193 S.E.2d 764 (Ct. App. North Carolina 1973).

Descriptors: *Alteration of flow, *North Carolina, *Drainage effects, *Drainage water, *Judicial decisions, Water law, Water policy, Legal aspects, Diversion structures, Flood control, Natural flow doctrine, Reasonable use, Relative rights, Water spreading, Earthworks, Diversion.

Plaintiff landowner sued defendant, a land developer, for damages to plaintiff's land and destruction of a bridge thereon. Defendant had piled dirt 30 feet high immediately adjacent to plaintiff's property, and following a heavy rainwater, rocks and mud flowed onto plaintiff's land causing the damage. The court held that a lower landowner is not required to receive such material which in the natural condition of the lands would not be carried by the normal flow of surface waters from the upper to the lower tracts. The court did not uphold the claim for destruction of the bridge, because it was merely destroyed by water, and a lower tract of land is burdened with an easement to receive waters from the upper tract, which naturally flows therefrom. Further, the owner of the higher tract may even increase the natural flow of water, so long as he does not divert it. However, the court remanded the case for a new trial on the issue of damages to the land itself resulting from the runoff of dirt and rocks from defendant's embankment. (Glickman-Florida)
W73-08710

INTERSTATE MOTELS, INC. V. BIERS (SUIT TO ENJOIN INTERFERENCE WITH ACCESS AND DRAINAGE RIGHTS).
193 S.E.2d 658 (Virginia 1973).

Descriptors: *Virginia, *Riparian rights, *Riparian land, *Water rights, *Judicial decisions, Tidal streams, Drainage, Water law, Legal aspects, Severance, Riparian waters, Water sources, Low water mark, High water mark, Outlets, Drainage practices, Watercourses (Legal aspects).
Identifiers: Subdivision plats.

Complainant and respondent owned adjoining lots. Complainant sought to enjoin respondent from damming a cove of a river which crossed respondent's lot and extended into complainant's, and claimed riparian and drainage rights in the cove. Since the purchase of his lot complainant had used the cove as an access to the river. Respondent contended that the original owner of both lots had manifested on the subdivision plat an intention to sever from complainant's lot the riparian rights and drainage rights in the cove in question. The court granted complainant an injunction, and held that if the original owner had intended to sever the riparian rights appurtenant to complainant's lot, it was necessary that he clearly manifest his intent to do so. The court felt that, to the contrary, he had displayed the intent that the riparian rights appurtenant to the lot were to be enjoyed by its owner, as indicated by the plat, which depicted the cove as extending into complainant's lot. (Glickman-Florida)
W73-08711

DOLPHIN LANE ASSOCIATES, LTD. V. TOWN OF SOUTHAMPTON (RIPARIAN OWNER'S RIGHTS IN INTERTIDAL AREAS).

339 N.Y.S.2d 966 (Sup. Ct. N.Y. 1971).

Descriptors: *New York, *Intertidal areas, *High water mark, *Public rights, Legal aspects, Zoning, Fluctuations, Water levels, Easements, Navigable waters, Water law, Local governments, Judicial decisions, Riparian rights, Riparian land, Boundaries (Property), Public access.
Identifiers: *Public trust doctrine.

Plaintiff landowner commenced this action to declare unconstitutional certain zoning ordinances enacted by the defendant municipality. The ordinance claimed on behalf of the people in the municipality superior title and/or interest to certain portions of the real property claimed to be owned by the plaintiff. The court held that a conveyance by a governmental agency of land fronting on a navigable body of water conveys title only to the high-water line and the applicable act of 1818 reserved to the inhabitants of the municipality a public easement over the beach land above the high water mark. This mark was defined by the court as a line marked by periodic flow of the tide, excluding any advance of water caused by winds, storms, and unusual conditions. The court went on to point out that the existence of certain flora was evidence of the high water mark, since it is a type of grass which thrives naturally in saltwater areas only if the soil from which it grows is regularly inundated twice a day by tidal flow. The court therefore held the ordinance was valid. (Mockler-Florida)
W73-08712

PIESCO V. FRANCESCA (VALIDITY OF WATERFRONT ZONING ORDINANCE).

338 N.Y.S.2d 286 (Sup. Ct. N.Y. 1972).

Descriptors: *New York, *Water zoning, *Land use, *Riparian rights, Zoning, Legal aspects, Local governments, Public rights, Water law, Marinas, Constitutional law, Judicial decisions, Legislation, Legal review, Non-structural alternatives, Riparian land.

This was an action brought by plaintiff landowner against defendant municipality seeking a judgment declaring a zoning ordinance passed by the municipality invalid insofar as it affected the plaintiff's waterfront property. The ordinance required plaintiffs to obtain special permits in order to build a marina. The court held that the upland lot owner was not entitled to a declaratory judgment that the zoning ordinance was confiscatory or invalid unless there was a factual showing to permit a determination of whether the plaintiff had suffered any significant economic injury. The court also indicated it was not discriminatory to allow other owners of waterfront property having nonconforming marina uses at the time of enactment of the zoning ordinance to continue such use and at the same time to disallow other owners a nonconforming use when application was made after enactment of the zoning regulation. Thus, the effect on plaintiff's riparian rights was held not invalid or discriminatory. (Mockler-Florida)
W73-08713

MCQUINN V. TANTALO (EXISTENCE OF EASEMENT OF NECESSITY WHERE PLAINTIFF'S LAND WAS ACCESSIBLE BY NAVIGABLE WATER).
339 N.Y.S.2d 541 (Sup. Ct. N.Y. 1973).

Descriptors: *New York, *Riparian land, *Easements, *Adjacent landowners, Equity, Judicial decisions, Right-of-way, Trespass, Water rights, Water law, Legal aspects.

Plaintiff riparian landowner brought suit to establish a right-of-way across the defendant adjacent landowner's lot to afford access to his lot. Plaintiff had access to his lot only via a navigable waterway. The court held that where the plaintiff's land was accessible by navigable water which plaintiff had the right to use, no way of necessity existed that would support an implied easement across the defendant's lot to afford plaintiff's access to his lot. (Mockler-Florida)
W73-08714

TEMPLETON V. HUSS (LIABILITY FOR ALTERATION OF SURFACE DRAINAGE).
292 N.E.2d 530 (Ct. App. Ill. 1973).

Descriptors: *Illinois, *Surface drainage, *Natural flow, *Alteration of flow, Judicial decisions, Legal aspects, Water rights, Diversion, Reasonable use, Relative rights, Surface runoff, Drainage effects, Drainage practices, Land development.

Plaintiff landowner sued for an injunction and damages against defendant subdividers alleging that in constructing a subdivision the defendants changed the natural course of the surface drainage and brought water from a different watershed into the natural watershed in which the plaintiff's land was located. Even though expert testimony was introduced, it failed to prove water from a different watershed was diverted onto plaintiff's land. The court held that owners of servient land have no cause of action against the owner of a dominant tract who alters its condition in such a manner that water, in the natural course of surface drainage, flows onto the servient tract at an increased rate and in much greater quantities. However, the court emphasized in dicta that the owner of a dominant tract cannot divert the natural course of drainage to bring in water from another watershed or remove natural barriers, thus allowing water which would not otherwise flow in such a direction to be deposited on the servient owner's land. Since plaintiff failed to prove this the relief sought was denied. (Mockler-Florida)
W73-08715

ZABEL V. PINELLAS COUNTY WATER AND NAVIGATION CONTROL AUTHORITY (GROUNDS FOR DENIAL OF DREDGE AND FILL PERMIT).
171 So. 2d 376-388 (Fla. 1965).

Descriptors: *Florida, *Permits, *Ownership of beds, *Wetlands, *Land development, Legal aspects, Eminent domain, Water rights, Navigable waters, Public rights, Dredging, Judicial decisions, Beds under water, Constitutional law, Riparian land, Riparian rights.
Identifiers: *Fill permits, Public trust doctrine.

Appellants, owners of upland property, appealed from a decision of the respondent County Water and Navigation Control Authority denying their request to fix a bulkhead line and to grant a dredge and permit to fill approximately 11.5 acres of their bottom land. Plaintiffs wanted to extend a trailer park situated on their upland property along the shore of the bay. The Florida Supreme Court held that the denial of the permission to fill amounted to a taking of private property without just compensation where it was not established that the granting of the permit would materially and adversely affect the public interest. The court also held that the conveyance from the state of bottom land in tidal waters carried with it the right to bulkhead and fill, which conveyance was presumptively valid and based upon a determination by the state that the public interest would not be impaired. (Mockler-Florida)
W73-08716

KENDRY V. STATE ROAD DEPARTMENT (INVERSE CONDEMNATION FROM ALTERATION OF DRAINAGE FLOW AND LOSS OF RIPARIAN RIGHTS).

213 So. 2d 23-31 (4th D.C.A. Fla. 1968).

Descriptors: *Florida, *Alteration of flow, *Drainage effects, *Easements, *Eminent domain, *Riparian rights, Legal aspects, Reasonable use, Navigable waters, Public access, Public rights, Riparian land, Floods, Drainage water, Judicial decisions, Highway effects.
Identifiers: Inverse condemnation.

Plaintiff landowner sued the defendant state road department for inverse condemnation. The road department began widening a highway which ran across plaintiff's land. This activity altered the drainage flow causing great amounts of water to flow upon plaintiff's property rendering it unfit for residential purposes. Also, the defendant filled in submerged lands along an adjacent navigable river; plaintiff claims title to this fill area and avers compensation is due for taking the fill area. Plaintiff contends defendant should be compelled to exercise its power of eminent domain as a means of making restitution for the alleged taking of plaintiff's property. The court held that where the state alters the drainage flow so as to cause a permanent invasion of the land by flooding rendering the land unfit for residential purposes, then there is a taking. Further, the court held that plaintiff is due compensation where the filling of submerged lands deprives him of his riparian rights. Riparian rights are compensable property interests. (Mockler-Florida)
W73-08717

SEWERAGE SYSTEMS AND ABATEMENT OF POLLUTION FROM INDUSTRIAL WASTES.

Ill. Ann. Stat. ch. 24 secs. 11-141-2 thru 11-151-5 (Smith-Hurd Supp. 1971).

Descriptors: *Sewage treatment, *Illinois, *Sewage disposal, *Legislation, Pollution abatement, Chlorination, Environmental sanitation, Sewerage, Water pollution, Water pollution sources, Water treatment, Sewage districts, Governments, Sewers, Industrial waste, Waste treatment.

Every municipality is authorized to construct or acquire and operate a sewerage system, and to enter into contracts with any industrial establish-

ment for the provision and operation by the municipality of sewerage facilities to abate or reduce the pollution of waters caused by discharges of industrial wastes. The municipalities shall also have the authority to issue revenue bonds to cover the costs of operation and acquisition. Before taking action, however, the corporate authorities of the municipality shall adopt an ordinance describing in general the contemplated project; that ordinance shall be published to allow the people of the municipality the opportunity to object. The municipality shall levy a tax to pay for the chlorination or other disinfection of the sewage. The corporate authorities may levy a tax to pay for defaulted sewerage system bonds. They may also provide by ordinance for the extension and maintenance of sewers and water mains to areas outside the corporate limits. This extension may be financed by revenue bonds. However, no municipality may furnish water or sanitary sewer service to any territory situated within a public water district. (Glickman-Florida)
W73-08718

JACKSONVILLE ELECTRIC AUTHORITY V. POLLUTION CONTROL BOARD (APPLICATION FOR PERMIT TO INSTALL ELECTRIC GENERATOR ADJACENT TO STREAM).
270 So. 2d 759-761 (1st D.C.A. Fla. 1973).

Descriptors: *Florida, *Judicial decisions, *Water pollution control, *Electric power, Environmental effects, Legal aspects, Water policy, Electric generators, Administrative agencies, Legal review, Administrative decisions, Legislation, Permits, Adjudication procedure, Water pollution sources.

This action involves a petition for a writ of certiorari to the State Pollution Control Board in which the petitioner, electric authority, seeks a review of two orders of the Pollution Control Board which denied petitioner's application for a permit to install an additional turbine generator at one of its plants. At the administrative hearing, expert testimony by scientists in almost all fields of biology and ecology indicated no adverse effects would result from the installation; however, the Board, without any competent evidence being presented contrary to the expert testimony, refused to grant the permit. On appeal, the court held this denial of the application was improper and indicated that excess control could and would violate the legislative intent in creating the Pollution Control Board when such control ignores the need of a continuing growth of economy and industrial development. Moreover, the court added that ecology and environment must to some extent yield to the needs and wants of the human factor in our scheme of life and happiness. (Mockler-Florida)
W73-08719

WATER POLLUTANTS--RECOVERY OF COST OF REMOVAL.
Ill. Ann. Stat. ch 85 secs. 1701 thru 1706 (Smith-Hurd Supp. 1971).

Descriptors: *Legislation, *Illinois, *Oil pollution, *Oil spills, *Oil wastes, Water pollution sources, Water pollution, Water law, Water policy, Pollution abatement, Water pollution control, Legal aspects, Water pollution, Impaired water quality, Water quality control.
Identifiers: Absolute liability.

It is the policy of Illinois that no oil shall be discharged into or upon any waters which are or may be used for providing a water supply; those responsible for any such discharge shall bear the costs of removal. Thus, the discharge of oil and other pollutants, directly or indirectly is prohibited. Whenever any oil is discharged into the waters, any governmental body having such waters within its jurisdiction is authorized to remove or arrange for the removal of the pollutant. The person responsible for the discharge shall be liable to such governmental body for the costs incurred in the cleanup operation. That person may still remain liable for damage to the property resulting from the discharge. (Glickman-Florida)
W73-08720

WATER SUPPLY AND SEWAGE SYSTEM.

Ill. Ann. Stat. ch. 24 secs 11-125-1 thru 11-139-11 (Smith-Hurd Supp. 1971).

Descriptors: *Illinois, *Water supply, *Sewage systems, *Legislation, Water works, Eminent domain, Condemnation, Water conveyance, Water control, Municipal wastes, Legal aspects, Bond issues, Costs, Local governments, Government finance, Municipal water, Water rates, Water management (Applied).

In order to construct a waterworks system or sewage system, each municipality has the power to levy special assessments on all property benefited therefrom within one mile from its corporate limits. The proceeds of the tax may be used solely for waterworks planning or construction. A municipality may also pay for such waterworks by the issuance and sale of revenue bonds. The issuance of these bonds shall be provided for by ordinance passed by the corporate authorities of the municipality. The city has the power of eminent domain. Several municipalities may jointly acquire and operate a waterworks which shall be run by a joint water commission. This commission is also authorized to issue revenue bonds to finance the project. Water may be sold to non-party municipalities or other political subdivisions, corporations or persons by the Commission. Any municipality may acquire and operate a combined waterworks and sewerage system and may finance it by issuing revenue bonds or applying federal monies. The municipalities may enact any rules and regulations necessary to maintain the system and preserve the public health. (Glickman-Florida)
W73-08721

STATE V. HARDEE (OWNERSHIP OF TIDELANDS AND SUBMERGED LANDS).
193 S.E.2d 497-509 (So. Car. 1972).

Descriptors: *South Carolina, *Intertidal areas, *Boundaries (Property), *Highwater mark, Tidal streams, Low water mark, Water law, Judicial decisions, Estuaries, Legal aspects, Water policy, Streambeds, Beds underwater, Beds, Navigable waters, Boundary disputes.
Identifiers: *Public trust doctrine.

The respondent, state, alleged in its complaint ownership of all tidelands, that being the area between the usual high and low water marks, and all submerged lands, that being the area below the usual low water mark. The state further alleged that it held title in trust for the people of the state. The appellant riparian landowner alleged ownership of the land in question down to the usual low water mark by virtue of a deed. The Supreme Court of South Carolina upheld the decision of the trial court in favor of the state. The court first stated that in determining the extent of the boundary of a body of land a different rule applied to tidal navigable streams such as the one in question than to nonnavigable streams. As to the latter, the boundary was generally conceded to be the middle of the stream, while as to the former it was deemed to be the high water mark in the absence of language to the contrary in a deed or plat. The appellant here failed to show such specific language in her deed, and thus the portion of land between the high and low water marks remained in ownership of the state for the benefit of the people. (Glickman-Florida)
W73-08722

SOLID WASTE DISPOSAL.

42 USC secs 3251 thru 3259 (1972).

Descriptors: *United States, *Waste treatment, *Waste disposal, *Solid wastes, Waste storage, Governments, State governments, Governmental interrelations, Water pollution sources, Pollution abatement, Water treatment, Legislation, Water law, Water policy, Radioactive waste disposal, Wastes, Local governments.

While the collection and disposal of solid wastes should continue to be primarily the function of state, regional and local agencies, the problems of waste disposal have become a matter national in scope which necessitates federal action through financial and technical assistance and leadership in the development of new and improved methods to reduce the amount of waste and unsalvagable materials and to provide for proper solid waste disposal practices. The Secretary of HEW shall conduct and render assistance to other agencies in the conduct of research and investigations to implement the purpose of this section, and shall also make public any information obtained through these experiments. The Secretary shall encourage cooperative activities by the states and local governments in connection with solid waste disposal programs. The Secretary may authorize grants to various administrative agencies to carry out the purposes of this act. The Secretary shall recommend to appropriate agencies guidelines for solid waste recovery, collection and separation systems which shall be consistent with the public health and welfare, and shall submit to Congress a comprehensive report for the creation of a system of national disposal sites for hazardous wastes. (Glickman-Florida)
W73-08723

CONTROL OF FLOODS AND CONSERVATION OF WATER.
Ill. Ann. Stat. ch. 19 secs. 121 thru 128.3 (Smith-Hurd 1972).

Descriptors: *Illinois, *Flood protection, *Flood control, *Watershed management, *Legislation, Administrative agencies, Eminent domain, Condemnation, Public health, Flood damage, Flood forecasting, Water policy, Watersheds (Basins), Floods, Water law, Rivers, Regulation, Flow control, Dams, Hydroelectric power.

The unregulated flow of the rivers and waters of Illinois constitutes a menace to the general welfare of the people of Illinois. Regulation is thus a proper activity of the state as are investigations and improvements of the rivers and waters for the purpose of controlling floods and low waters. The Illinois Department of Transportation is authorized to make the necessary examinations and constructions of improvements, either by doing the work itself or letting contracts to do the work. The Department may enter into cooperative agreements with federal and municipal agencies to implement the purpose of this section. Where surplus waters become available in the construction of works, the Department may operate a power plant and dispose of the power so generated. The Department may exercise the power of eminent domain if necessary. In the case of emergencies due to floods, the Department may make expenditures for the purpose of flood relief. Watershed protection is found to offer a sound approach to flood protection. The Illinois Department of Agriculture is authorized to plan for works of improvement in any approved watershed in the state. (Glickman-Florida)
W73-08724

REPORT OF THE TEXAS WATER DEVELOPMENT BOARD FOR THE BIENNIUM SEPTEMBER 1, 1970 THROUGH AUGUST 31, 1972.
Texas Water Development Board, Austin.

Report, 1973. 75 p, 31 fig, append.

Descriptors: *Water resources development, *Groundwater resources, *Surface waters, *Texas, Planning, Projections, Evaluation, Water quality, Water yield, Water users, Water demand, Hydrologic data, Reviews, Sedimentation, Aquifers, Streamflow, Water utilization, Water conservation, Well data, Estuaries, Land use, Legal aspects, Watershed management.

The primary goal of the Texas Water Development Board is to assure that the present and future water requirements of the people of Texas are met. In the biennium, September 1, 1970 through August 31, 1972, the Board oriented its program and activities toward solution of present or immediately foreseeable water supply problems. Some internal agency reorganization was initiated to improve functional operations. Techniques of program monitoring and control were employed to improve program performance and budget efficiency. The Board's programs and organization and some issues involving water resource development are described. Approximately 50 reports published during the biennium are listed in the appendix. (Woodard-USGS)
W73-08732

THE CALIFORNIA STATE WATER PROJECT SUMMARY: NINETEEN-SEVENTY-ONE.
California State Dept. of Water Resources, Sacramento.
For primary bibliographic entry see Field 04A.
W73-08749

A DESCRIPTION AND ANALYSIS OF COASTAL ZONE AND SHORELAND MANAGEMENT PROGRAMS IN THE UNITED STATES,
Michigan Univ., Ann Arbor. Sea Grant Program.
For primary bibliographic entry see Field 02L.
W73-08887

PUBLIC WATER SUPPLY SYSTEMS RULES AND REGULATIONS.
Illinois State Dept. of Health, Springfield. Div. of Sanitary Engineering.

Illinois Department of Public Health, Division of Sanitary Engineering, Springfield, (1970). 24 p.

Descriptors: *Administration, *Water works, *Water treatment, *Illinois, *Regulation, *Municipal water, Permits, Water quality standards, Legal aspects, Construction, Public health, Water supply, Water distribution (Applied), Water supply development, Engineering, Safety, State governments.
Identifiers: Water supply rules.

The safeguarding of public health through water supply system control was set forth by the State of Illinois Department of Public Health in July 1959. In 1970, the establishment of the Illinois Environmental Protection Agency was accompanied by the transfer of the Division of Public Water Supplies from the Department of Public Health to the Illinois Environmental Protection Agency. The rules and regulations were transferred unchanged. There are six main articles in the rules, namely: (1) definitions, (2) submission of plan documents, (3) design of waterworks, (4) protection of water supplies during repair work or construction, (5) operation and maintenance, and (6) rules of practice in administrative hearings. Article three, pertaining to waterworks design, covers eight topics; these are (1) surface water supplies, (2) groundwater supplies, (3) pumping stations, (4) storage reservoirs, (5) distribution systems, (6) chlorination, (7) cross-connections and (8) disinfection. (Poertner)
W73-08893

INDUSTRIAL WASTE MANUAL, A GUIDE FOR THE PREPARATION OF APPLICATIONS, REPORTS AND PLANS.
Pennsylvania Dept. of Environmental Resources, Harrisburg. Bureau of Water Quality Management.

Publication Number 14, 1971. 35 p.

Descriptors: *Industrial wastes, *Administration, *Regulation, *Pennsylvania, Water quality control, Water pollution control, Permits, Legal aspects, State governments.
Identifiers: *Industrial waste manual.

Because streams serve as both sources of water supply and as receivers and carriers of waste water from homes, farms, factories and mines, conflicts of interest between water users and waste discharges are inevitable. The Pennsylvania Department of Environmental Resources has been empowered by law to abate surface and groundwater pollution and has written this manual as a guide for the preparation of waste discharge applications, reports, and plans from industrial sources. Minimum standards are set, with the understanding that further revision and more stringent standards may be forthcoming. This guide is divided into four parts, namely: (1) general information on the Clean Streams Law of Pennsylvania, the Bureau of Water Quality Management and the role of other agencies in waste discharges; (2) the procedure for obtaining a permit; (3) waste treatment requirements; and (4) pollution incident prevention. It is emphasized that this publication is intended only as a guide and that specific instances may require special regulations. Acid mine drainage from coal or clay mines are not covered in this manual, but this is covered in a separate report. All other industrial processes are covered by this guide. (Poertner)
W73-08895

INCOG FUNCTIONAL PLAN SUPPLEMENTS (WATER AND SEWER, HOUSING AND OPEN SPACE).
Indian Nations Council of Governments, Tulsa, Okla.
For primary bibliographic entry see Field 06B.
W73-08989

A MODEL OF A PRIVATE ENVIRONMENTAL AGENCY,
T. A. Ferrar, and A. Whinston.
(1972), 28 p, 2 fig, 9 ref. OWRR-B-020-IND (17). 14-31-0001-3080.

Descriptors: Environment, *Management, Quality control, *Governments, Economics, *Pollution abatement, *Water quality, *Social needs, Resource allocation, Economies of scale, Marginal costs, Optimization, Constraints, Waste disposal, Air pollution, Numerical analysis, Equations, Reach (Streams), Environmental sanitation.
Identifiers: *Private agencies, *Environmental use permits, Environmental property rights, Environmental assimilative capacity, Free enterprise, Market equilibrium price.

The efficacy of creating government-regulated private agencies to control a region's air and water quality is considered. Assumed is the formation of a government commission responsible for specifying environmental quality standards as a measure of the legal supply of naturally available environmental waste disposal capacity. This environmental commission would establish a private environmental agency giving it the responsibility of maintaining the environmental quality standards in the given region, and giving it the right to sell user permits or environmental property rights to potential municipal or industrial polluters; the revenue obtained from the sale of these rights would be invested in environmental improvement facilities, reducing the burden on the established municipal and industrial structure while protecting the environment to the specified level. Specifically, this paper portrays the existence of two key private-public sector linking parameter sets, and outlines the welfare trade-off existing between environmental use permit production and capital resource efficient utilization. The framework presented permits the criterion efficiency to modify the initial politically related structure to one reflecting economies of scale, thus restoring the competitive efficiency characteristics of free enterprise operation to the area of environmental management. (Bell-Cornell)
W73-09009

JIM KEE SPEAKS ON WATER RESOURCES,
House, Washington, D.C.
J. Wright.
Congressional Record, Vol. 118, p E8861-E8862 (daily ed.) Oct. 18, 1972. 2 p.

Descriptors: *Bank protection, *Legislation, *Ohio River, *Flood control, *Water pollution control, Federal government, West Virginia, Judicial decisions, Water pollution, Navigable waters, Cost-benefit analysis, Legal aspects, Water law, Administrative agencies, Natural resources, United States, Supervisory control (Power), Floods, Flood protection.
Identifiers: Standing (Legal), National Environmental Policy Act, Federal Water Pollution Control Act Amendments of 1972, Injunctions (Prohibitory).

This statement concerns legislation coming out of the 92nd Congress. First, the omnibus rivers and harbors and flood control bill is discussed. This legislation contains an authorization for bank protection works along the Ohio River from upstream New Matamoras to Cincinnati and local flood protection works at Chillicothe prior to the beginning of construction of the Mill Creek Reservoir. Then there is the Federal Water Pollution Control Act Amendments of 1972. Coupled with legislation already passed this legislation will go far in reducing and eliminating pollution to rivers and streams. The question of standing and the use of injunctive relief is reviewed in relationship to Sierra Club v. Morton. The court held: a person has standing only if he can show that he himself has suffered or will suffer injury, whether economic or otherwise. Proposed legislation for the 93rd Congress on limiting increases on interest rates used in figuring cost-benefit ratios is discussed. The National Environmental Policy Act of 1969 is also discussed. (Tolle-Florida)
W73-09011

NEW CONCEPTS IN SITING OF NUCLEAR POWER PLANTS,
House, Washington, D.C.
J. L. Evins.
Congressional Record, Vol. 118, p. E8820-E8822 (daily ed.) October 18, 1972. 3 p, 15 ref.

Descriptors: *Nuclear energy, *Nuclear powerplants, *Environmental effects, *Power system operation, Breeder reactors, Desalination, Desalination plants, Offshore platforms, Electricity, Water resources development, Rivers, Streams, Oceans, Thermal pollution, Nuclear wastes, Water pollution sources, Energy.
Identifiers: *Atomic Energy Act of 1954.

If the needs and goals of our energy-dependent society are to be met, this country must efficiently tap all its available resources. However, public concern over possible environmental effects, and a growing competition for available land and water resources have made it more difficult to obtain nuclear power plant sites. The Commissioner of the Atomic Energy Commission addressed himself to this problem in a speech inserted in the Congressional Record. The Commissioner discussed the status of nuclear power in the United States

and the uses to which it could be put in desalination processes. The dual purpose vector might give rise to the energy center. An energy center means an integrated complex in which the large scale production of energy is effectively combined with consuming industries at a single site or contiguous area. These centers might also form the nucleus of a new city. Power plants might be located on large barges or man-made islands. The power plant park and its attendant difficulties are also discussed. Current research on other potential sources of electric power is also mentioned. (Reed-Florida)
W73-09012

FOREIGN POLICY ISSUES AND THE LAW OF THE SEA CONFERENCE,
House, Washington, D.C.
T. M. Pelly.
Congressional Record, Vol. 118, p. E8931-E8934 (daily ed.) October 25, 1972. 4 p.

Descriptors: *International law, *International waters, *Law of the sea, *United Nations, United States, Federal Government, Natural resources, Investment, Oceans, Commercial fishing, Pacific Northwest U.S., Legal aspects, Jurisdiction, Political aspects, Washington, Marine fisheries.
Identifiers: International Law of the Sea Conference.

This address was delivered on October 11, 1972, at a meeting at the University of Washington in Seattle on the local aspects and interest in United Nations' Meetings on the International Law of the Sea. The speaker was the Hon. John R. Stevenson, the legal advisor to the Department of State. The general outline of issues and the difficulties in establishing agreement on new and up-to-date international conventions were presented. Because of the divergence of view regarding what is permitted under current international law, there is too great a tendency to overlook the gradual convergence of ideas on what effect of the Law of the Sea Conference should be. The overwhelming majority of states from all regions are supporting agreement on a 12-mile territorial sea. Also there is widespread support for the establishment of an international regime for the seabeds in the area beyond coastal state economic jurisdiction. The major problems to be resolved include: (1) free transit of straits used for international navigation; (2) the nature of coastal state rights over resources beyond the territorial sea; (3) treaty standards protecting the integrity of investment in developing coastal countries; and (4) scientific research, particularly in areas of coastal state resource jurisdiction. (Tolle-Florida)
W73-09013

NEW TECHNIQUES IN WATER POLLUTION CONTROL,
House, Washington, D.C.
G. Gude.
Congressional Record, Vol. 118, p E8947 (daily ed.) October 25, 1972. 1 p.

Descriptors: *Nutrient removal, *Water pollution control, *Phosphorous, *Sewage treatment, Sanitary engineering, Great Lakes, Sewage effluents, Canada, Sewage, Illinois, Waste water (Pollution), Sewerage, Pumping plants, Environmental engineering, Public health, Biological treatment, Treatment facilities, Water quality control.

A new biological process was developed to successfully remove phosphorus from sewage. Biospherics Incorporated reports that its PhoStrip method reduced sewage effluent phosphorus levels to meet regulations imposed by the State of Illinois this year on the Great Lakes and the Fox River. Similar regulations have been adopted by Canada and the United States to curb pollution in the Great Lakes. Tests conducted in Chicago lasted 22 days, and represented the third sewage treatment plant where the Biospherics PhoStrip process was pilot tested. The others were the Washington, D.C. Water Pollution Control Plant, and the Piscataway Plant in southwestern Prince George's County, Maryland. The phosphorus removed from the sewage effluent was concentrated into a waste flow of approximately five percent of the total plant flow resulting in proportionately lower treatment costs. The phosphorus could be chemically removed from this relatively small volume by currently available standard methods. Complete details of the process will be published in the October 1973 issue of the Journal of the Water Pollution Control Federation. (Tolle-Florida)
W73-09014

HERCULES CONTINUES TO FIGHT POLLUTION,
House, Washington, D.C.
E. J. Patten.
Congressional Record, Vol. 118, p. E8988 (daily ed.) October 25, 1972. 1 p.

Descriptors: *Pollution abatement, *Industrial wastes, *Pollutant identification, *Discharge (Water), Regulation, Communication, Annual costs, Waste water (Pollution), Water pollution control, Water pollution effects, Air pollution, Air pollution effects, New Jersey, Industrial plants, Water quality control, Waste treatment, Treatment facilities.

Those companies doing outstanding jobs of trying to clean up the environment are commended. Such a company is Hercules, Inc., operating one of its plants in Parlin, New Jersey. A formal corporate policy was developed by Hercules in 1967 to: 'do more than just comply with (pollution) regulations. We want to fully carry out our responsibilities for air and water quality in the communities of which we are a part'. In order to carry out this policy, Hercules set up an Environmental Health Committee. The Committee, formed in late 1967, monitors air, water and solid waste pollution abatement practices in 48 principal domestic plants located in 25 states. Although the Committee sees to it that each Hercules operating department pays attention to abatement problems and regulations, the plant manager is directly responsible for pollution control in his plant. At Hercules, each plant has a pollution abatement coordinator responsible for all pollution control activities. In a study made last year an estimated 35 percent of the operating expenses of pollution control facilities was returned to the plant by more efficient plant operations, the recovery of waste materials, and the reduction in water usage and other utilities. (Tolle-Florida)
W73-09015

6F. Nonstructural Alternatives

DOLPHIN LANE ASSOCIATES, LTD. V. TOWN OF SOUTHAMPTON (RIPARIAN OWNER'S RIGHTS IN INTERTIDAL AREAS).
For primary bibliographic entry see Field 06E.
W73-08712

PIESCO V. FRANCESCA (VALIDITY OF WATERFRONT ZONING ORDINANCE).
For primary bibliographic entry see Field 06E.
W73-08713

6G. Ecologic Impact of Water Development

UNDERGROUND NUCLEAR POWER PLANT SITING,
Aerospace Corp., San Bernardino, Calif.
M. B. Watson, W. A. Kammer, L. A. Selzer, R. L. Beck, and N. P. Langley.
California Institute of Technology, Environmental Quality Laboratory, Pasadena, EQL Report No 6, September 1972. 42 fig, 4 tab, 10 ref, 7 append.

Descriptors: *Nuclear power plants, *Structural engineering, *Estimated costs, *Safety, *Underground powerplants, Electric power production, Engineering, Geology, Earthquakes, Estimating, Evaluation, Estimated benefits, Model studies, Systems analysis, Structural design, Underground structures, Rock mechanics.

This study is part of a larger evaluation which examines the problems associated with the siting of nuclear power plants. It is based on four partially buried European facilities and the discussion is restricted to light-water nuclear power plants of about 1000 Mwe, using present designs for components of the nuclear steam system. The postulated advantages to underground siting would be greater safety, reduced area requirements and improved aesthetics. The basic structural configurations and equipment packaging are presented. Three different underground plants are examined; two which represent the straight-forward adaptation of surface PWR and BWR plants and the third represents a reconfigured BWR plant in which the pressure supression emergency system has been eliminated. Structural liners and the depth of burial of the plants are discussed. Typical rock media should provide adequate insulation against leakage of radioactive material. A rough estimate of the cost penalty associated with underground siting is presented, based on 1970-1972 construction costs. (Jerome-Vanderbilt)
W73-08617

CRUDE OIL AND NATURAL GAS PRODUCTION IN NAVIGABLE WATERS ALONG THE TEXAS COAST (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Galveston, Tex.
For primary bibliographic entry see Field 05G.
W73-08661

WATER QUALITY IN A STRESSED ENVIRONMENT, READINGS IN ENVIRONMENTAL HYDROLOGY.
For primary bibliographic entry see Field 05G.
W73-08662

ENVIRONMENTAL DATA BANK.
For primary bibliographic entry see Field 07C.
W73-08663

RIVER ECOLOGY AND MAN.

Proceedings of an International Symposium on River Ecology and the Impact of Man, held at the Univ. of Mass., June 20-23, 1971. Academic Press, New York, 1972, R.T. Oglesby, C.A. Cadson and J.A. McCann, editors. 465 p, 17 fig, 2 map, 12 photo, 9 tab, 5 chart, 164 ref.

Descriptors: *Geomorphology, *Sedimentology, *Aquatic life, *Pesticide residues, *Radioactive wastes, Ecosystems, Water pollution sources, Poisons, Balance of nature, Water pollution effects, Thermal pollution, Disharge (Water), Chemical analysis, Marine geology, Environmental effects, Marine plants, Marine animals, Rivers, Columbia River, Delaware River, Waste discharges, Nutrients.
Identifiers: Illinois River.

In a series of symposium papers, the term river is described and defined in terms of the flora, fauna, chemical composition and geomorphometry by specialists in each field. Case histories of specific rivers, past and present, throughout the world are given with special emphasis placed on man's interaction with them. There is a consideration of the effects of various river uses on morphometry,

discharge and sedimentation; and analyses of the impact of heat, radionuclides, pesticides and industrial wastes on river ecosystems are also presented. Finally, the economic, environmental and political implications of the multiple use of rivers in an attempt to avoid disastrous side effects in the future are explored. (Dunham-Florida)
W73-08664

ENVIRONMENTAL IMPACT STATEMENTS--A DUTY OF INDEPENDENT INVESTIGATION BY FEDERAL AGENCIES.

University of Colorado Law Review, Vol 44, p 161-172, 1972. 63 ref.

Descriptors: *Legislation, *Administrative decisions, *Decision making, *Federal project policy, *Administrative agencies, Judicial decisions, Federal jurisdiction, Legal review, Environmental control, Permits, Law enforcement, Project planning, Adjudication procedure, Environmental effects, Planning, Water resources development, Legal aspects.
Identifiers: *National Environmental Policy Act, Environmental Impact Statements.

The Second Circuit Court of Appeals has recently held that the detailed environmental impact statements required by the National Environmental Policy Act (NEPA) must be prepared and developed by the agency itself which is proposing the action. The agency cannot satisfy NEPA by preparing the statement on the basis of information provided by others. This case, Green County Planning Board v. Federal Power Commission, makes it clear that federal agencies have an affirmative duty not only to consider environmental factors and include them in the record, but to do so at every stage of the process. This duty cannot be delegated. The practical impact of the holding is to increase substantially the agency's work load. The practical ability of the federal agencies to supply the type of analysis required is doubted, unless further funds are made available for NEPA implementation. The thrust of the decision is to neutralize technological bias by prohibiting industry participation in the planning stages. NEPA is in trouble due to the distance between the goals it sets and the means and will available to implement its procedures. However, this decision may do a great deal to further long-range environmental planning under NEPA. (Smith-Adam-Florida)
W73-08666

AN ANALYSIS OF ENVIRONMENTAL STATEMENTS FOR CORPS OF ENGINEERS WATER PROJECTS,
Stanford Univ., Calif. Dept. of Civil Engineering.
L. Ortolano, and W. W. Hill.
Available from National Technical Information Service as AD-747 374, Price: $3.00 in paper copy, $1.45 in microfiche. Report to Army Engineer Institute for Water Resources, June 1972. 135 p, 15 tab.

Descriptors: *Coastal structures, *Inland waterways, *Engineering structures, *Environmental effects, Jetties, Breakwaters, Dredging, Coastal engineering, Spoil banks, Groins, Dikes, Barriers, Ecology, Channels, Reservoirs, Levees, Construction, Conservation, Water resources development, Water pollution, Federal government, Administrative agencies, Dam construction, Federal project policy, Channeling.
Identifiers: *Army Corps of Engineers, *National Environmental Policy Act, *Environmental Impact Statements, Revetments.

The first 234 environmental impact statements prepared by the Army Corps of Engineers through August of 1971, in response to requirements of the National Environmental Policy Act (NEPA), are analyzed. Included is a catalog of impact statements along with a summary and discussion of the statements in two main areas: (1) projects on coastal waters, and (2) projects on inland waters. The coastal waters projects are subdivided into: (a) dredging, (b) spoil disposal, (c) breakwaters, (d) jetties and groins, and (e) revetments, dikes and barriers. The inland waters projects are subdivided into: (a) channelization, (b) dams and reservoirs, (c) levees, (d) dredging, (e) spoil disposal, (f) construction activities, and (g) miscellaneous structures and activities. There is a discussion of alternatives, short term uses and long term productivity, irreversible and irretrievable resource commitments, and controversial issues. Finally there are suggestions for improving the content of future impact statements to better comply with NEPA and Council on Environmental Quality guidelines. (Dunham-Florida)
W73-08673

LEGISLATIVE NEEDS IN WATER RESOURCES MANAGEMENT IN ALABAMA,
Alabama Univ., University. Natural Resources Center.
For primary bibliographic entry see Field 06E.
W73-08674

CALIFORNIA LAWYERS LEAD ENVIRONMENTAL FIGHT,
For primary bibliographic entry see Field 06E.
W73-08675

STATEMENT OF FINDINGS--BAL HARBOUR, FLORIDA, PARTIAL BEACH RESTORATION, BEACH EROSION CONTROL AND HURRICANE PROTECTION PROJECT, DADE COUNTY, FLORIDA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Jacksonville, Fla.
For primary bibliographic entry see Field 04A.
W73-08680

ROUGE RIVER FLOOD CONTROL PROJECT. SECTION B FROM I-94 TO MICHIGAN AVENUE ALTERNATIVE NO. IV (SUPPLEMENT TO FINAL ENVIRONMENTAL IMPACT STATEMENT).
For primary bibliographic entry see Field 08A.
W73-08681

FLOOD CONTROL ON SAGINAW RIVER, MICHIGAN AND TRIBUTARIES; FLINT RIVER AT FLINT, SWARTZ, AND THREAD CREEKS (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Detroit, Mich.
For primary bibliographic entry see Field 08A.
W73-08682

AQUATIC PLANT CONTROL AND ERADICATION PROGRAM, STATE OF TEXAS (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Galveston, Tex.
For primary bibliographic entry see Field 04A.
W73-08683

EDWARDS UNDERGROUND RESERVOIR, GUADALUPE, SAN ANTONIO, AND NUECES RIVERS AND TRIBUTARIES, TEXAS (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Fort Worth, Tex.
For primary bibliographic entry see Field 08A.
W73-08684

SOUTH BRANCH, RAHWAY RIVER, NEW JERSEY, FLOOD CONTROL PROJECT, RAHWAY, NEW JERSEY (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, New York.
For primary bibliographic entry see Field 08A.
W73-08685

SANTA PAULA CREEK CHANNEL, VENTURA COUNTY, CALIFORNIA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Los Angeles, Calif.
For primary bibliographic entry see Field 08A.
W73-08686

OLIVER BOTTOMS RESOURCE CONSERVATION AND DEVELOPMENT PROJECT, SEBASTIAN COUNTY, ARKANSAS (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Soil Conservation Service, Washington, D.C.
For primary bibliographic entry see Field 04D.
W73-08687

PEYTON CREEK, TEXAS--FLOOD CONTROL (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Galveston, Tex.
For primary bibliographic entry see Field 08A.
W73-08688

FLOOD CONTROL PROJECT, THOMPSON'S CREEK, HOLLAND PATENT, NEW YORK (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, New York.
For primary bibliographic entry see Field 08A.
W73-08689

CAMP GROUND LAKE, SALT RIVER BASIN, KENTUCKY (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Louisville, Ky.
For primary bibliographic entry see Field 08A.
W73-08690

PERRY COUNTY DRAINAGE AND LEVEE DISTRICTS NOS. 1, 2, AND 3, MISSOURI (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, St. Louis, Mo.
For primary bibliographic entry see Field 08A.
W73-08691

PROPOSED NEW LOCK--PICKWICK LANDING DAM (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Tennessee Valley Authority, Chattanooga.
For primary bibliographic entry see Field 08C.
W73-08692

WILDERNESS SOCIETY V. MORTON (INJUNCTIVE RELIEF SOUGHT AGAINST THE ISSUANCE OF LAND USE PERMIT FOR CONSTRUCTION PURPOSES ON THE TRANS--ALASKAN PIPELINE PROJECT).
For primary bibliographic entry see Field 06E.
W73-08693

DALY V. VOLPE (ENVIRONMENTAL STUDIES REQUIRED FOR HIGHWAY CONSTRUCTION).
For primary bibliographic entry see Field 06E.
W73-08694

ENVIRONMENTAL DEFENSE FUND, INC. V. ARMSTRONG (ACTION FOR INJUNCTIVE AND OTHER RELIEF WITH RESPECT TO THE NEW MELONES DAM PROJECT).
For primary bibliographic entry see Field 06E.
W73-08706

LAND USE AND DEVELOPMENT ALONG THE TENNESSEE RIVER IN THE TARCOG REGION.
Top of Alabama Regional Council of Governments, Huntsville.
For primary bibliographic entry see Field 06B.
W73-08988

FINAL ENVIRONMENTAL STATEMENT RELATED TO OPERATION OF CALVERT CLIFFS NUCLEAR POWER PLANT UNITS 1 AND 2.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 05B.
W73-08993

FINAL ENVIRONMENTAL STATEMENT FOR THE EDWIN I. HATCH NUCLEAR PLANT UNITS 1 AND 2.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 05B.
W73-08994

FINAL ENVIRONMENTAL STATEMENT RELATED TO OPERATION OF SHOREHAM NUCLEAR POWER STATION.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 05B.
W73-08995

FINAL ENVIRONMENTAL STATEMENT RELATED TO OPERATION OF THREE MILE ISLAND NUCLEAR STATION UNITS 1 AND 2.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 05B.
W73-08996

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE LA SALLE COUNTY NUCLEAR STATION.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 05B.
W73-08997

A MODEL OF A PRIVATE ENVIRONMENTAL AGENCY,
For primary bibliographic entry see Field 06E.
W73-09009

NEW CONCEPTS IN SITING OF NUCLEAR POWER PLANTS,
House, Washington, D.C.
For primary bibliographic entry see Field 06E.
W73-09012

07. RESOURCES DATA

7A. Network Design

DATA REQUIREMENTS FOR MODELING A GROUND-WATER SYSTEM IN AN ARID REGION,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 02F.
W73-09078

7B. Data Acquisition

LOCATION OF SOLUTION CHANNELS AND SINKHOLES AT DAM SITES AND BACKWATER AREAS BY SEISMIC METHODS: PART II--CORRELATION OF SEISMIC DATA WITH ENGINEERING PROPERTIES,
Kentucky Water Resources Inst., Lexington.
V. P. Drnevich.
Available from the National Technical Information Service as PB-220 064, $3.00 in paper copy, $1.45 in microfiche. Research Report No 55, August 1972. 30 p, 6 fig, 4 tab, 11 ref, 1 append. OWRR A-026-KY (4), Agreement 14-31-0001-3217.

Descriptors: *Seismic studies, *Borehole geophysics, *Rock mechanics, *Poisson ratio, Foundation rocks, Mechanical properties, Rock properties, Elasticity (Mechanical), Shear strength, Compressibility, Subsurface investigations.

The methods of seismic refraction surveying may be adapted to the accurate determination of depth and undulation of a rock surface where the depth to rock is less than 50 feet. Four seismic field methods and a laboratory method were used to determine shear wave propagation velocities and shear moduli for two sites. The four seismic methods are standard seismic refraction survey, downhole shooting refraction survey, transient Rayleigh wave survey, and crosshole shooting survey. A torsional resonant column apparatus was used for the laboratory tests. The crosshole shooting method gave the best results because direct measurements were made. Methods which measure compression wave velocity give inconsistent results because the conversion to shear wave velocity is very sensitive to Poisson's ratio. Laboratory tests data gave consistently low values. Strength reduction due to sampling was one cause. Laboratory tests also showed increase in values with time. None of the seismic methods discussed should be the sole subsurface investigative tool when engineering properties are desired. They must be used in conjunction with conventional boring, sampling, and laboratory testing techniques to gain a more complete picture of existing subsurface conditions. (See also W73-08466) (Knapp-USGS)
W73-08467

DEVELOPMENT AND TESTING OF A DOUBLE-BEAM ABSORPTION SPECTROGRAPH FOR THE SIMULTANEOUS DETERMINATION OF DIFFERENT CATIONS IN WATER,
Kentucky Water Resources Inst., Lexington.
For primary bibliographic entry see Field 02K.
W73-08469

DETERMINATION OF TRACE ELEMENTS IN WATER UTILIZING ATOMIC ABSORPTION SPECTROSCOPY MEASUREMENT,
Kentucky Water Resources Inst., Lexington.
For primary bibliographic entry see Field 05A.
W73-08470

METHODS OF ANTICIPATING AVALANCHE HAZARD FROM RAINFALL AND SNOWFALL INTENSITIES IN MOUNTAINS OF ZAILISKI ALA TAU (SPOSOBY PROGNOZA LAVINNOY OPASNOSTI PO INTENSIVNOSTI OSADKOV I SNEGOPADOV V GORAKH ZAILIYSKOGO ALATAU),
Sredneaziatskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Tashkent (USSR).
For primary bibliographic entry see Field 02C.
W73-08489

ATMOSPHERIC EFFECTS ON OCEAN SURFACE TEMPERATURE SENSING FROM THE NOAA SATELLITE SCANNING RADIOMETER,
National Oceanic and Atmospheric Administration, Miami, Fla. Physical Oceanography Lab.
G. A. Maul, and M. Sidran.
Journal of Geophysical Research, Vol 78, No 12, p 1909-1916, April 20, 1973. 4 fig, 1 tab, 17 ref.

Descriptors: *Remote sensing, *Satellites (Artificial), *Water temperature, *Sea water, Calibrations, Cloud cover, Data processing, Humidity.
Identifiers: *Radiometers.

The effects of atmospheric state, nadir angle, cloud amount, cloud height, and random noise on temperature data from the NOAA series satellites were investigated. These satellites have a dual-channel (visible and infrared) scanning radiometer. Temperature departures for nadir viewing range from 22 deg K for a dry winter atmosphere to 10.5 deg K under moist subtropical summer conditions. An 8 deg K temperature difference at the sea surface when viewed at zero nadir angle through the 30 deg N July standard atmosphere registers less than 3 deg K at the satellite and is further compressed to 1 deg K when viewed at a 60 deg nadir angle. A 10% cloud cover can introduce errors that range from 0.5 deg K to 4 deg K depending on cumuloform cloud height; hence clouds must be completely eliminated in the analysis. Random noise in radiosonde data can introduce errors greater than 1 deg K for any given sounding; however, compositing and smoothing will eliminate most of this error source. A correction scheme for cloud-free conditions is developed that is essentially free of bias. A reasonable error estimate for the total system is of the order of 2 deg K. (Knapp-USGS)
W73-08496

SNOW-WATER EQUIVALENT MEASUREMENT USING NATURAL GAMMA EMISSION,
Geological Survey of Canada, Ottawa (Ontario).
For primary bibliographic entry see Field 02C.
W73-08505

A METHOD FOR STUDYING SOIL-WATER PROPERTIES OF SOIL PROFILES,
Agricultural Research Council, Cambridge, (England). Unit of Soil Physics.
For primary bibliographic entry see Field 02G.
W73-08510

GAS CHROMATOGRAPH INJECTION SYSTEM,
National Aeronautics and Space Administration, Moffett Field, Calif. Ames Research Center.
G. E. Pollock, M. E. Henderson, and R. W. Donaldson, Jr.
Available from the National Technical Information Service as N92-21433, $3.00 in paper copy, $1.45 in microfiche. Report Nos NASA-CASE-ARC-10344-1, US-PATENT-APPL-SN-180962, September 16, 1971. 13 p.

Descriptors: *Gas chromatography, *Laboratory equipment, Research equipment, Instrumentation.
Identifiers: *Injection systems.

This patent covers a gas chromatograph injection system which consists of a sample chamber instead of a septum. The sample is placed in the chamber at room temperature and pressure and the solvent removed by evaporation. After the chamber is closed, the position of the carrier gas control value is changed, the chamber is heated, and the sample is volatilized and swept into the analysis apparatus. Disadvantages of syringe injection methods are obviated. (Little-Battelle)
W73-08528

A REAPPRAISAL: CORRELATION TECHNIQUES APPLIED TO GAS CHROMATOGRAPHY,
Warren Spring Lab., Stevenage (England). Control Engineering Div.
For primary bibliographic entry see Field 05A.
W73-08535

AN APPLICATION OF MULTIVARIATE ANALYSIS TO COMPLEX SAMPLE SURVEY DATA,
North Carolina Univ., Chapel Hill. Dept. of Biostatistics.
G. G. Koch, and S. Lemeshow.
Journal of the American Statistical Association, Vol 67, No 340, p 780-782, December 1972. 3 tab, 12 ref.

Descriptors: *Sampling, *Estimating, Statistical methods.

Identifiers: *Multivariate analysis, *Variance, Replication, Balanced repeated replication, Univariate analysis.

A standard method of multivariate analysis is adapted to a highly complex sampling design utilizing the method of balanced repeated replication for calculating valid and consistent estimates of variance. An example illustrates that by doing univariate tests no significant differences are found between two groups. However, the multivariate approach yields a significant result because the directions of the differences between two groups with respect to two positively correlated variables are reversed. (Little-Battelle)
W73-08538

A UNIQUE COMPUTER CENTERED INSTRUMENT FOR SIMULTANEOUS ABSORBANCE AND FLUORESCENCE MEASUREMENTS,
Michigan State Univ., East Lansing. Dept. of Chemistry; and Michigan State Univ., East Lansing. Dept. of Biochemistry.
J. F. Holland, R. E. Teets, and A. Timnick.
Analytical Chemistry, Vol 45, No 1, p 145-153, January 1973. 6 fig, 5 tab, 29 ref.

Descriptors: *Instrumentation, *Data processing, *Fluorescence, *Digital computers, Rhodamine, Automation, Computer programs, Automatic control, Absorption, Research equipment, Laboratory equipment, Design, Sulfates.
Identifiers: *Spectrophotometers, *Spectrofluorimeters, *Absorbance, Quinine bisulfate, Anthracene, Absorption corrected fluorescence, Quantum efficiency.

A computer centered spectrophotometer-spectrofluorimeter combination instrument has been fabricated that will allow simultaneous absorption and fluorescence measurements. The dedicated computer applies corrections to the data collected for many of the instrumental and photophysical variables of fluorescence measurements. From data collected during an excitation scan, the computer can output absorbance, fluorescence, quanta corrected fluorescence, and a unique quantity, partial quantum efficiency. From an emission scan, absorbance, fluorescence, quantum corrected fluorescence, and total quantum efficiency can be obtained. Absorption corrected fluorescence is the name proposed for measurements which correct for the attenuation of excitation beam by absorption processes in the sample cell. The computer program is detailed and results are presented to evaluate the system for the various absorption and fluorescence measurements. Samples of quinine bisulfate, anthracene, and Rhodamine B were analyzed with the equipment. (Little-Battelle)
W73-08541

IMPROVED TECHNIQUE FOR ANALYSIS OF CARBOHYDRATES IN SEDIMENTS,
Rosenstiel School of Marine and Atmospheric Sciences, Miami, Fla.
For primary bibliographic entry see Field 05A.
W73-08556

EXPENDABLE BATHYTHERMOGRAPH OBSERVATIONS FROM SHIPS OF OPPORTUNITY,
National Marine Fisheries Service, La Jolla, Calif. Fishery-Oceanography Center.
J. F. T. Saur, and P. D. Stevens.
Mariners Weather Log, Vol 16, No 1, p 1-8, January 1972. 4 tab, 6 fig.

Descriptors: *Oceans, *Water temperature, *Bathythermographs, Oceanography, On-site testing, Sampling, Instrumentation, Aquatic environment, Physical properties, Currents, Thermal stratification, Thermocline, Geophysics, Marine biology.

A relatively new expendable bathythermograph called the XBT has made it possible to take ocean temperature readings to a depth of 760 m from cooperating nonoceanographic vessels. This is significant because temperature is one of the most basic oceanographic factors in such marine biological and physical problems as the relation of marine organisms to their environment; migration patterns and group behavior; the monitoring of ocean currents; the relationship of large bodies of water to weather; and the propagation of sound in the sea. The bathythermograph system which consists of a launcher, a recorder and expendable probes and signal wires, is described and discussed. The simple observational procedures, which generally take no longer than 20 min. and do not interfere with the ship's operation, are reviewed. Programs for XBT observations on ships of opportunity are supported by separate or cooperative projects among several government agencies and some of these are discussed briefly. Further studies should result in a more complete picture of ocean currents and temperatures. (Jerome-Vanderbilt)
W73-08629

DELINEATION OF INFORMATION REQUIREMENTS OF THE T.V.A. WITH RESPECT TO REMOTE SENSING DATA,
Tennessee Univ., Knoxville.
J. B. Rehder.
Available from NTIS, Springfield, Va 22151 as PB-210 114 Price $3.00 printed copy; $1.45 microfiche. Geological Survey Interagency Report USGS-235, December 1971. 20 p, 12 ref.

Descriptors: *Tennessee Valley Authority, *Data collections, *Aerial photography, *Satellites (Artificial), *Project planning, Water resources development, Land use, Agriculture, Recreation facilities, Land development, Land management, Investigations, Evaluation, Methodology.
Identifiers: Data needs, Interviews.

The information needs and interests of T.V.A. (Tennessee Valley Authority) that can be supplied by hyperaltitude imagery and future ERTS-A satellite imagery were determined by interviews. Two series of interviews were used to obtain specific data requirements keyed to the topics of information needed, the variation of scales and coverage involved between aircraft and satellite platforms, and temporal considerations. (Woodard-USGS)
W73-08737

MATHEMATICAL ANALYSIS: STILL-WATER GAGE,
Louisiana State Univ., Baton Rouge. Dept. of Chemical Engineering.
T. F. Dominick, B. Wilkins, Jr., and H. W. Roberts.
Available from NTIS, Springfield, Va. 22151, as AD-755 157. Price $3.00 printed copy; $1.45 microfiche. Louisiana State University Coastal Studies Bulletin No 7, p 115-124, Technical Report 132, January 1973. 6 fig, 7 ref. ONR-GP Contract N00014-69-A-0211-0003.

Descriptors: *Waves (Water), *Water level fluctuations, *Gages, Instrumentation, Calibrations.
Identifiers: *Wave gages.

The response of a stillwater gage to wave action was analyzed. The mean water level in the gage coincides with the mean level of the impinging waves for symmetric wave shapes. For asymmetric wave shapes the mean level in the gage may not coincide with the mean level of the impinging waves. Deviations between the mean levels are a function of height, shape, period of the wave, and the dimensions of the gage. Prediction of the order of magnitude of the error for asymmetric waves is possible with given figures, which may also be used to choose gage dimensions to minimize the inherent error. (Knapp-USGS)
W73-08755

DEEP-SEA CIRROMORPHS (CEPHALOPODA) PHOTOGRAPHED IN THE ARCTIC OCEAN,
Oregon State Univ., Corvallis. Dept. of Oceanography.
W. G. Pearcy, and A. Beal.
Deep-Sea Research and Oceanographic Abstracts, Vol. 20, No. 1, p 107-108, January 1973. 2 fig, 1 tab, 4 ref.

Descriptors: *Mollusks, *Arctic Ocean, Invertebrates, Marine animals, Systematics, Deep-water habitats, Deep water, Animal populations, On-site data collections, Photography.
Identifiers: *Cephalopods, *Cirromophs, Macroinvertebrates, Underwater cameras.

Cirromorphs (cephalopods) were photographed just above the sea floor in the Arctic Ocean during the summer of 1965. Photographs were obtained with a 35 mm EG and G Deep-Sea Camera from the USS Staten Island (AGB-S) at 6 locations north of Point Barrow, Alaska. The camera was positioned above the bottom using a Precision Depth Recorder and pinger attached to the camera. The usual distance above the bottom was six meters. Over 2900 photos were examined. Cirromorphs appeared in 21 photos representing a maximum of 12 separate individuals. The cirromorphs photographed had a prominent oval head, large fins inserted near its well-developed eyes, a web or umbrella that extended to the tips of the arms and long cirri on the arms. A secondary web (a web extending from the arms to the main web) was not evident. (Holoman-Battelle)
W73-08759

THE USE OF MATCHED SAMPLING AND REGRESSION ADJSTMENT TO REMOVE BIAS IN OBSERVATIONAL STUDIES,
Harvard University, Cambridge, Mass. Dept of Statistics.
D. B. Rubin.
Biometrics, Vol 29, No 1, p 185-203, March 1973. 1 fig, 6 tab, 5 ref.

Descriptors: *Sampling, Statistical methods, Regression analysis.
Identifiers: *Bias, *Matched sampling, *Regression adjustment, Bias reduction.

The ability of matched sampling and linear regression adjustment to reduce the bias of an estimate of the treatment effect in two sample observational studies is investigated for a simple matching method and five simple estimates. Monte Carlo results are given for moderately linear exponential response surfaces and analytic results are presented for quadratic response surfaces. The conclusions are (1) in general both matched sampling and regression adjustment can be expected to reduce bias, (2) in some cases when the variance of the matching variable differs in the two populations both matching and regression adjustment can increase bias, (3) when the variance of the matching variable is the same in the two populations and the distributions of the matching variable are symmetric the usual convariance adjusted estimate based on random samples is almost unbiased, and (4) the combination of regression adjustment in matched samples generally produces the least biased estimate. (Little-Battelle)
W73-08775

MATCHING TO REMOVE BIAS IN OBSERVATIONAL STUDIES,
Harvard Univ., Cambridge, Mass. Dept. of Statistics.
D. B. Rubin.
Biometrics, Vol 29, No 1, p 159-183, March 1973. 2 fig, 7 tab, 18 ref, 3 append.

Descriptors: Statistical methods, Sampling.
Identifiers: *Bias, *Matched sampling, Mean matching, Pair matching, Bias reduction.

Several matching methods that match all of one sample from another larger sample on a continous matching variable are compared with respect to their ability to remove the bias of the matching variable. One method is a simple mean-matching method and three are nearest available pair-matching methods. The methods' abilities to remove bias are also compared with the theoretical maximum given fixed distributions and fixed sample sizes. A summary of advice to an investigator is included. (Little-Battelle)
W73-08776

THE ANALYSIS OF DESIGNED EXPERIMENTS WITH CENSORED OBSERVATIONS,
Unilever Ltd., Sharnbrook (England). Unilever Research Lab.
J. Taylor.
Biometrics, Vol 29, No 1, p 35-43, March 1973. 3 tab, 10 ref.

Descriptors: *Statistical methods, Methodology.
Identifiers: *Experimental design, *Censored observations, Tiku's approximation, Bias, Errors.

An observation is said to be 'censored' if we know only that it is less than (or greater than) a certain known value. Sampford and Taylor (1959) proposed an iterative method of analysis for randomized block experiments with Type I censoring, and this method can also be used for other experimental designs. The method has been applied to simulated data. The results confirm that parameters can be estimated with only a small bias, and that it is possible to do an approximate t-test to compare treatment means. An approximation due to Tiku will reduce the labor of calculation. (Holoman-Battelle)
W73-08777

ION-EXCHANGE FOAM CHROMATOGRAPHY. PART I. PREPARATION OF RIGID AND FLEXIBLE ION-EXCHANGE FOAMS,
Eotvos Lorand Univ., Budapest (Hungary). Inst. of Inorganic and Analytical Chemistry.
For primary bibliographic entry see Field 02K.
W73-08783

PRACTICAL CONSIDERATIONS FOR DIGITIZING ANALOG SIGNALS,
Alberta Univ., Edmonton. Dept. of Chemistry.
For primary bibliographic entry see Field 07C.
W73-08791

AN AIR-LIFT FOR SAMPLING FRESHWATER BENTHOS,
Reading Univ. (England). Dept. of Zoology.
A. P. Mackey.
Oikos, Vol 23, No 3, p 413-415, 1972. 1 fig, 1 tab, 4 ref.

Descriptors: *Sampling, *Bottom sediments, *Freshwater, *Benthos, *Aquatic life, Invertebrates, Aquatic insects, Annelids, Mollusks, Crustaceans, Design, Construction, Methodology, Benthic flora, Benthic fauna, Equipment, Oligochaetes, Mussels, Isopods, Amphipoda, Mayflies, Midges, Clams.
Identifiers: *Air-lift sampler, Maitland corer, Macroinvertebrates, Leeches, Asellus, Scuds, Water mites.

An air-lift has been designed for sampling freshwater sediments with their associated flora and fauna. It consists of a 3-m length of plastic drainpipe of 80 mm internal diameter. The upper end is bent over to discharge into a container. Compressed air from a cylinder at the surface is fed into the lower end of the pipe through natural rubber tubing of 10 mm internal diameter and 2 mm normal wall. This tube joins a U-shaped brass feed pipe. The air cylinder is connected to the rubber tubing by an 'A' clamp of the type used in aqualung diving. When the depth of core taken needs to be regulated, a circular metal disc with a large central hole through which the tube of the air-lift passes, may be fitted. Information is given on the procedure for sampling the various types of sediments. The main advantages of this apparatus are that it is light, cheap to construct, and can be used to sample most freshwater sediments. A preliminary sorting of material can be carried out while the sample is being taken. That the air-lift can sample unionid mssels and flints of approximately 40 mm diameter is an indication of the size of particle that can be sampled. Test results are presented from a comparison between the air-lift and a Maitland corer. (Holoman-Battelle)
W73-08795

MODERN APPROACH TO COASTAL ZONE SURVEY,
Michigan Univ., Ann Arbor. Willow Run Labs.
For primary bibliographic entry see Field 02L.
W73-08805

SOME APPLICATIONS OF PHOTOGRAPHY, THERMAL IMAGERY AND X BAND SIDE LOOKING RADAR TO THE COASTAL ZONE,
Grumman Ecosystems Corp., Bethpage, N.Y.
For primary bibliographic entry see Field 02L.
W73-08806

TECHNIQUES AND EQUIPMENT FOR SAMPLING BENTHIC ORGANISMS,
Oregon State Univ., Corvallis. Dept. of Oceanography.
For primary bibliographic entry see Field 02L.
W73-08834

METHODS FOR THE MEASUREMENT OF HANFORD-INDUCED GAMMA RADIOACTIVITY IN THE OCEAN,
(AEC), Division of Biology and Medicine, Washington, D.C.
For primary bibliographic entry see Field 02L.
W73-08841

FLAME PHOTOMETRIC ANALYSIS OF THE TRANSPORT OF SEA SALT PARTICLES,
National Oceanic and Atmospheric Administration, Hilo, Hawaii. Mauna Loa Observatory.
For primary bibliographic entry see Field 02K.
W73-08854

DYNAMIC MEASUREMENT OF SOIL AND LEAF WATER POTENTIAL WITH A DOUBLE LOOP PELTIER TYPE THERMOCOUPLE PSYCHROMETER,
British Columbia Univ., Vancouver. Dept. of Soil Science.
For primary bibliographic entry see Field 02G.
W73-08878

SOIL WATER FLOWMETERS WITH THERMOCOUPLE OUTPUTS,
Agricultural Research Service, Kimberly, Idaho. Snake River Conservation Research Center.
For primary bibliographic entry see Field 02G.
W73-08879

DESIGN AND EVALUATION OF A LOW COST RECORDING SPECTROPOLARIMETER,
Cleveland State Univ., Ohio. Dept. of Chemistry.
S. J. Simon, and K. H. Pearson.
Analytical Chemistry, Vol 45, No 3, p 620-623, March 1973. 6 fig, 3 tab.

Descriptors: *Aqueous solutions, Laboratory equipment.
Identifiers: *Recording spectropolarimeter, *Errors, *Optical rotatory dispersion, Sucrose, Neodymium-D (-)PTDA, Tris (D- (-)-1 2-propylenediamine)cobalt (III) iodide, Spectropolarimetry.

A Perkin-Elmer Model 141 polarimeter was modified to obtain continuous optical rotatory dispersion data over the entire spectral region of 650-240 nanometers. Standard solution of sucrose in deionized water, neodymium-D (-)PDTA, and Tris (D- (-)-1,2-propylenediamine)cobalt (III) iodide were prepared and the errors between observed and calculated ORD values determined. The results show that the equipment performed satisfactorily. (Little-Battelle)
W73-08919

SOUND VELOCIMETERS MONITOR PROCESS STREAMS,
NUSonics, Inc. Paramus, N.J.
For primary bibliographic entry see Field 05A.
W73-08933

AERIAL REMOTE SENSING, A BIBLIOGRAPHY.
Office of Water Resources Research, Washington, D.C.

Available from the National Technical Information Service as PB-220 163, $10.60 in paper copy, $1.45 in microfiche. Water Resources Scientific Information Center Report WRSIC 73-211, March 1973. 482 p. (edited by Donald B. Stafford, Clemson University)

Descriptors: *Remote sensing, *Bibliographies, *Aerial photography, *Data collections, *Earth resources, Hydrologic data, Infrared radiation, Instrumentation, Mapping, Microwaves, Monitoring, Oil spills, Photogrammetry, Pollutant identification, Sattelites (Artificial), Telemetry, Water temperature.

This report, containing 272 abstracts, is another in a series of planned bibliographies in water resources to be produced from the information base comprising SELECTED WATER RESOURCES ABSTRACTS (SWRA). At the time of search for this bibliography, the data base had 50,631 abstracts covering SWRA through December 15, 1972 (Volume 5, Number 24). Author and subject indexes are included.
W73-08974

COMPARATIVE CHARACTERISTICS OF CONTINUOUS COUNTING AND SAMPLING METHODS FOR REGISTERING YOUNG PACIFIC SALMON, (IN RUSSIAN),
E. T. Nikolaeva.
Izv Tikhookean Nauchno-Issled Inst Rybn Khoz Okeanogr. 78, p 73-80, 1970. English summary.
Identifiers: Counting methods, *Pacific salmon, Registering, *Salmon, *Sampling.

A series of experiments were done to verify the effectiveness of widely used sampling methods for registering migrating salmon young in the Far East. The effectiveness of the traps depends on the dimensions of the down-stream migrants, so that established coefficients of trapping capacity vary for different species of juveniles. The effectiveness of sampling methods can increase by replacement of short sturdy traps with shorter finer ones.--Copyright 1972, Biological Abstracts, Inc.
W73-09043

A DEVICE FOR COLLECTING IN-SITU SAMPLES OF SUSPENDED SEDIMENT FOR MICROSCOPIC ANALYSIS,
Johns Hopkins Univ., Baltimore, Md. Chesapeake Bay Inst.
J. R. Schubel, and E. W. Schiemer.
J Mar Res. Vol 30, No 2, p 269-273. 1972. Illus.

Identifiers: Aquatic sampler, Collecting device, Sediments, *Suspended sediment, *Sampling, Instrumentation.

An in-situ sampler for collecting small samples of suspended sediment for microscopic analysis has been built and tested. The device rapidly freezes a thin layer of water entrapping all of the suspended particles in it; when the sampler is recovered, the disc of ice is placed on a suitable substrate and freeze-dried. The particles can then be examined in an undisturbed state with a light microscope or with an electron microscope.--Copyright 1972, Biological Abstracts, Inc.
W73-09056

METHODS OF DETECTING FUNGI IN ORGANIC DETRITUS IN WATER,
Queen's Univ., Belfast (Northern Ireland). Dept. of Botany.
D. Park.
Trans Br Mycol Soc. Vol 58, No 2, p 281-290. 1972.
Identifiers: Ecology, *Fungi, *Ireland, Isolation, *Organic detritus, Streams, Unpolluted water, Microoganisms.

Observations were made of the fungi in 8 unpolluted streams in Northern Ireland, using different techniques of isolation, and the results are recorded. It is suggested that the systematic use of several methods of isolation can yield valuable information on the ecology of micro-organisms.--Copyright 1972, Biological Abstracts, Inc.
W73-09057

DEVELOPMENT OF A DISCHARGE MEASUREMENT DEVICE FOR SEWER FLOW,
Illinois Univ., Urbana. Dept. of Civil Engineering.
H. G. Wenzel, B. E. Burris, and C. D. Morris.
Paper presented at 8th American Water Resources Conference, October 30 - November 2, 1972, St. Louis, Missouri, 1972. 20 p, 9 fig, 1 tab, 6 ref. OWRR B-063-Ill (1).

Descriptors: *Flow measurement, *Flowmeters, *Discharge measurements, Venturi meters, *Urban runoff, Storm drains, Venturi flumes, Sewers, Instrumentation.

A suitable meter for continuous in-system flow measurement should be reasonably accurate throughout a range of flow measurement including free surface and pressurized flow conditions, cause minimum reduction in flow capacity, require a minimum of field maintenance, be capable of continuous, real time measurement with remote data transmission, and could be built at reasonable cost. A Venturi device was designed to act as a Venturi type flume under free surface or part full conditions and as a conventional pipe Venturi meter under pressurized of full flow conditions. The constriction should be designed for a specific installation with the acceptable reduction in capacity and error in discharge prescribed. (Knapp-USGS)
W73-09085

RADIO ECHO SOUNDING ON A VALLEY GLACIER IN EAST GREENLAND,
Scott Polar Research Inst., Cambridge (England).
For primary bibliographic entry see Field 02C.
W73-09091

SEISMIC REFRACTION AND REFLECTION MEASUREMENTS AT 'BYRD' STATION, ANTARTICA,
Wisconsin Univ., Middleton. Geophysical and Polar Research Center.
For primary bibliographic entry see Field 02C.
W73-09093

A PHOTOGRAMMETRIC SURVEY OF HOSEASON GLACIER, KEMP COAST, ANTARCTICA,
Ohio State Univ., Columbus. Dept. of Geodetic Science; and Ohio State Univ. Research Foundation, Columbus. Inst. of Polar Studies.
For primary bibliographic entry see Field 02C.
W73-09094

GLACIER BORE-HOLE PHOTOGRAPHY,
California Inst. of Tech., Pasadena. Div. of Geological and Planetary Sciences.
For primary bibliographic entry see Field 02C.
W73-09096

RADIO ECHO SOUNDING: BRINE PERCOLATION LAYER,
Wisconsin Univ., Middleton. Geophysical and Polar Research Center.
For primary bibliographic entry see Field 02C.
W73-09097

ACOUSTIC EMISSION IN SNOW AT CONSTANT RATES OF DEFORMATION,
Montana State Univ., Bozeman. Dept. of Earth Sciences.
For primary bibliographic entry see Field 02C.
W73-09098

7C. Evaluation, Processing and Publication

FLOOD-PRONE AREAS, HARTFORD NORTH QUADRANGLE, CONNECTICUT,
Geological Survey, Washington, D.C.
M. P. Thomas.
For sale by USGS, Washington, D C 20242 Price - 75 cents. Geological Survey Miscellaneous Geologic Investigations Maps, Map I-784-M, 1972. 1 sheet, 1 map.

Descriptors: *Flood frequency, *Flood recurrence interval, *Connecticut, Mapping, Hydrologic data, Cities, Flood plains, Reservoirs, Streams, Streamflow.
Identifiers: *Hartford (Conn), North quadrangle.

A map (scale 1:24,000) shows flood-prone areas in the Hartford North quadrangle, Connecticut. Areas shown on the map have a 1-in-100 chance on the average of being flooded during any year. The areas were delineated for natural conditions but, where necessary, were adjusted for the effects of storage in flood-control reservoirs and channel improvements that existed in 1972. Smaller areas (not shown separately on map) within those shown have a greater than 1-in-100 chance on the average of being flooded during any year; some areas immediately adjacent to streams may be flooded almost every year. Larger areas outside those shown have a less than 1-in-100 chance on the average of being flooded during any year. Depth and duration of flooding are not indicated. (Woodard-USGS)
W73-08472

MAP SHOWING GENERAL AVAILABILITY OF GROUND WATER IN THE SALINA QUADRANGLE, UTAH,
Geological Survey, Washington, D.C.
D. Price.
For sale by USGS, Washington, D C 20242 Price-75 cents. Geological Survey Miscellaneous Geologic Investigations Maps, Map I-591-M, 1972. 1 sheet, 1 map.

Descriptors: *Groundwater resources, *Water wells, *Water yield, *Utah, Maps, Locating, Aquifers, Hydrologic data.
Identifiers: *Salina quadrangle (Utah).

This map of Salina quadrangle, Utah, scale 1:250,000, shows the general availability of groundwater as determined from well records collected by the U.S. Geological Survey and cooperating State, local, and other Federal agencies. Data are for aquifers that in most places are less than 1,000 feet below the land surface. In areas of few or no wells, potential well yields are inferred from geological data. Various colors are used to indicate locations where well yields range from less than 1 to 10 gpm, 5 to 50 gpm, and 50 to 1,000 gpm. (Woodard-USGS)
W73-08473

RUNOFF MAP OF SWEDEN: AVERAGE ANNUAL RUNOFF FOR THE PERIOD 1931-60,
Sveriges Meteorologiska och Hydrologiska Institut, Stockholm.
O. Tryselius.
Meddelanden (Communications, Series C, No 7), Stockholm, 1971. 2 p, 1 map, 9 ref.

Descriptors: *Runoff, *Average runoff, *Hydrologic data, Maps, Foreign countries, Precipitation (atmospheric), Data collections, Rain gages, Snowfall, Melt water, Meteorological data, Water balance, Hydrology, Streamflow.
Identifiers: *Sweden.

A map (scale 1:3,000,000) showing the normal average annual runoff in Sweden from 1931-60 is intended for hydrological purposes and therefore the runoff is given in liters per second per square kilometer. The runoff map is mainly based on point values of precipitation minus evaporation, but adjustments and corrections have also been made where actual runoff values from small drainage basins are known. A pure statistical computation of the results from the precipitation stations gives a normal average annual precipitation of 588 mm for Sweden during the period 1931-60. (Woodard-USGS)
W73-08492

FILLING IN GAPS IN RAINFALL RECORDS BY SIMULATED DATA,
Food and Agriculture Organization of the United Nations, Iraklion (Greece). United Nations Development Programme.
For primary bibliographic entry see Field 02B.
W73-08506

SOME DESIGNS AND ANALYSES FOR TEMPORALLY INDEPENDENT EXPERIMENTS INVOLVING CORRELATED BIVARIATE RESPONSES,
California Polytechnic State Univ., San Luis Obispo. Dept. of Computer Science and Statistics.
For primary bibliographic entry see Field 04A.
W73-08546

ON-LINE COMPUTER SYSTEM FOR AUTOMATIC ANALYZERS,
Food and Drug Administration, Chicago, Ill.
M. W. Overton, L. L. Alber, and D. E. Smith.
Journal of the Association of Official Analytical Chemists, Vol 56, No 1, p 140-146, January 1973. 3 fig, 1 tab.

Descriptors: *Digital computers, *Data processing, Automation, Automatic control, Programming languages.
Identifiers: *Autoanalyzer, Spectrophotometers.

A computer system has been developed for acquisition and reduction of data obtained from an Autoanalyzer. An 8K core memory computer was interfaced with the Autoanalyzer through an operational amplifier manifold and plug-in components. The interfacing circuitry is based on the use of a retransmitting slidewire mounted on the pen cable pulley of the spectrophotometer. The program, which is included was written in

FOCAL-12 and can be easily modified. The system is easily adapted to a wide variety of instruments where analog data are collected as a function of time. (Little-Battelle)
W73-08568

APPLICATION OF A LABORATORY ANALOG-DIGITAL COMPUTER SYSTEM TO DATA ACQUISITION AND REDUCTION FOR QUANTITATIVE ANALYSES,
Department of Agriculture, Agassiz (British Columbia). Research Station.
M. K. John, and C. J. Van Laerhoven.
Journal of the Association of Official Analytical Chemists, Vol 56, No 1, p 135-139, January 1973. 1 fig, 10 ref.

Descriptors: *Laboratory equipment, *Programming languages, *Data processing, Computer programs, Automatic control, Electronic equipment, Analog computers, Digital computers.
Identifiers: *Data acquisition, *Analog-digital computer, FOCAL-8, Minicomputers, Ion selective electrodes, pH meters, Colorimeters, Atomic absorption spectrophotometer.

A flexible, general purpose program was developed for a laboratory data acquisition and reduction system employing a minicomputer for off-line processing of digitized data readings from electroanalytical instrumentation. Instrument data from the on-line operation of a hard-wired analog-to-digital data acquisition subsystem in conjunction with an atomic absorption instrument, a colorimeter, or a pH/millivolt meter for specific-ion electrode determinations, are transformed into concentration units by using a linear interpolation method. The relationship between instrument measurements and quantitative data is approximated by several straight-line segments between the graphical coordinates associated with each of the reference standards analyzed. The coordinates are determined by calibrating readings and known concentrations. Routines are included to edit incorrect raw readings and to make corrections to compensate for unavoidable deviations from standard analytical procedure. The FOCAL-8 language program, therefore, permits unattended processing of sequentially read paper tape input. The results punched on paper tape are easily transferred to a large computer for more sophisticated data analysis and storage. (Holoman-Battelle)
W73-08569

ANALYSIS OF SELECTED EXISTING WATER QUALITY DATA ON THE CONNECTICUT RIVER,
Massachusetts Univ., Amherst. Dept. of Public Health.
For primary bibliographic entry see Field 05B.
W73-08605

CREATION OF CONDITIONAL DEPENDENCY MATRICES BASED ON A STOCHASTIC STREAMFLOW SYNTHESIS TECHNIQUE,
Arizona Univ., Tucson. Dept. of Systems Engineering.
For primary bibliographic entry see Field 02E.
W73-08608

THE COLHEAT RIVER SIMULATION MODEL.
Hanford Engineering Development Lab., Richland, Wash.
For primary bibliographic entry see Field 05B.
W73-08624

KNOW WHAT'S HAPPENING IN YOUR WATER SYSTEM,
Parsons, Brinckerhoff, Quade and Douglas, Inc., New York.
For primary bibliographic entry see Field 04A.
W73-08655

ENVIRONMENTAL DATA BANK.

Hearings--Subcomm. on Fisheries and Wildlife Conservation--Comm. on Merchant Marine and Fisheries, U.S. House of Representatives, 91st Cong, 2d Sess, June 2, 3, 25, 26, 1970. 395 p, 17 fig, 8 photo, 5 tab, 2 chart, 7 ref.

Descriptors: *Legislation, *Information retrieval, *Data collections, *Data storage and retrieval, Legal aspects, United States, Environmental control, Documentation, Data processing, Computers, Computer models, Data transmission, Statistics, Environment.
Identifiers: *Congressional hearing, *National Environmental Policy Act.

These hearings took testimony on an amendment to the National Environmental Policy Act of 1969 which would provide a powerful tool for implementing the letter and spirit of the Act, a national environmental data bank. The data bank would serve as the central national depository of all information relating to the environment. Technical experts reported that such a system could be operative within a two or three year period. This system would be useful for many planning decisions. Included within this report are typical data which have been stored in a model of the proposed data bank. The model system under development is geared to meet the informational needs of not only scientists and planners but also laymen. The system will contain data programs both in quantity and quality. The base of the system will come in part from existing information sources of various governmental agencies but the total data base is still not defined. Included are several data bank proposals and existing information storage systems of various governmental agencies. (Beardsley-Florida)
W73-08663

TERRESTRIAL SURVEYING AND GEOLOGICAL MAPPING OF THE ROCK FACE OF THE DEWATERED AMERICAN NIAGARA FALLS,
Department of the Environment, Ottawa (Ontario). Inland Waters Branch.
I. A. Reid.
1972. 5 SHEETS, 6 MAPS, 2 REF.

Descriptors: *Waterfalls, *United States, *Canada, *Geologic mapping, *Geological surveys, Methodology, Dewatering, Channels, Engineering structures, Cofferdams, Aerial photography, Photogrammetry, Terrain analysis, Rock properties, Bedrock, Planning.
Identifiers: *Niagara Falls, *American Falls, *Canadian Horseshoe Falls, *Waterfall deterioration control, Rock face.

The crest lines of Niagara Falls (the American Falls and the Canadian Horseshoe Falls) have been receding steadily throughout history, due to the eroding action of flowing water on the rock structure of the falls. The channel bed at the falls consists primarily of hard dolomite underlain by shale. Shale, more susceptible to weathering than dolomite, erodes more readily. Thus, the harder dolomitic rocks are undermined, and rockfalls result at the crest. Descriptions of the bedrock formation exposed on the rock face are shown on maps. In addition, there is a selection of 28 profiles of the rock face, which are identified by profile identification numbers. To carry out mapping and drilling operations, the channel was dewatered June 12, 1969 by constructing a cofferdam at the head of the American Falls Channel between Goat Island and the U.S. mainland, and diverting the flow through existing power canals. The surveying and mapping of the channel and rock face was a cooperative venture involving the Canadian Department of the Environment and the Buffalo District Office of the United States Army Corps of Engineers. (Woodard-USGS)
W73-08727

HYDROGRAPH SIMULATION MODELS OF THE HILLSBOROUGH AND ALAFIA RIVERS, FLORIDA: A PRELIMINARY REPORT,
Geological Survey, Tampa, Fla.
For primary bibliographic entry see Field 04A.
W73-08733

STREAM GAUGING INFORMATION, AUSTRALIA, SUPPLEMENT 1970.
Australian Water Resources Council, Canberra.

Australian Government Publishing Service, Canberra, 1972. 39 p.

Descriptors: *Stream gages, *Gaging stations, *Australia, Flow measurement, Streamflow, Sites, Indexing, Surface waters, River basins, Data collections, Hydrologic data.

This publication is a supplement to Stream Gauging Information, Australia, December 1969 published by the Australian Government Publishing Service and is intended for use in conjunction with that publication. Details of 150 new gaging stations and other stations established throughout Australia during the year ended December 31, 1970 are given. In addition 30 stations were upgraded through improvements in control or through installation of more advanced instrumentation and equipment. The supplement also lists 12 stations which had been omitted from the previous publication. The 22 authorities which undertake stream gaging are listed with the number of stream gaging stations operated by each of them in December 1970. The total number of stations was 2,405. In comparison the number of stream gaging stations operated by these authorities in December 1969 was 2,275. The gaging information is presented by drainage divisions. The numbering system is in accordance with that used in Stream Gauging Information, Australia, December 1969. Comments are provided in the columns headed 'Variation' and 'Remarks'. Where information on the purpose of the station has been provided this is shown in the 'Remarks' column. (Woodard-USGS)
W73-08738

GROUNDWATER RESOURCES OF WASHINGTON COUNTY, TEXAS,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 04B.
W73-08739

GROUNDWATER RESOURCES OF NAVARRO COUNTY, TEXAS,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 04B.
W73-08740

GROUND-WATER RESOURCES OF HARDEMAN COUNTY, TEXAS,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 04B.
W73-08741

GREAT LAKES ICE COVER, WINTER 1969-70,
National Ocean Survey, Detroit, Mich. Lake Survey Center.
For primary bibliographic entry see Field 02C.
W73-08743

SUSPENDED SEDIMENT DATA SUMMARY, AUGUST 1969 - JULY 1970 (MOUTH OF BAY TO HEAD OF BAY),
Johns Hopkins Univ., Baltimore, Md. Chesapeake Bay Inst.
J. R. Schubel, C. H. Morrow, W. B. Cronin, and A. Mason.
Available from NTIS, Springfield, Va 22151 as COM-72-11184 Price $3.00 printed copy; $1.45

microfiche. Special Report 18, (Reference 70-10), November 1970. 39 p, 1 fig, 1 tab, 1 ref.

Descriptors: *Sediment transport, *Suspended load, *Organic matter, *Salinity, *Chesapeake Bay, Water temperature, Weather data, Data collections, Methodology, Estuaries, Bays.

Monthly surveys (August 1969 - July 1970) were conducted to determine the spatial and temporal variations of a number of the characteristic properties of suspended sediment in the Chesapeake Bay. These properties include the concentration of total suspended solids (suspended sediment) and the percent of the concentration of total suspended solids made up of combustible organic matter. The concentrations of total suspended solids (suspended sediment) were determined by filtration of measured volumes of water through preweighed filters. The concentrations of total particulate organic matter were estimated by determining the loss of mass of the total solids on ignition. Salinities were computed from measurements of conductivity and temperature made with the Chesapeake Bay Institute Induction Conductivity Temperature Indicator. Weather conditions at the time of sampling were noted. (Woodard-USGS)
W73-08744

WATER-LEVEL RECORDS, 1969-73, AND HYDROGEOLOGIC DATA FOR THE NORTHERN HIGH PLAINS OF COLORADO,
Geological Survey, Washington, D.C.
W. E. Hofstra, and R. R. Luckey.
Colorado Water Resources Basic-Data Release No 28, 1973. 52 p, 1 fig, 2 tab.

Descriptors: *Groundwater resources, *Water levels, *Water wells, *Aquifer characteristics, *Colorado, Water utilization, Irrigation, Water level fluctuations, Well data, Hydrogeology, Hydrologic data, Basic data collections.
Identifiers: *Northern High Plains (Colo).

The northern High Plains of Colorado is bounded by the State line on the east, the South Platte River on the north, the Arkansas River on the south, and extends about 8 miles west beyond Lincoln County. The 9,500 square-mile area includes all or part of 11 counties. Irrigation supplies are derived almost entirely from wells tapping the Ogallala Formation. The Ogallala, of Pliocene and locally of Miocene age, consists of sand, gravel, silt, and clay, and ranges in thickness from a few feet on the west to as much as 400 feet in places near the state line. Wells tap the following geologic units: Quaternary deposits undivided, Ogallala Formation, White River Group, and the Niobrara Formation. Water level measurements were made during the winter prior to the 1973 irrigation season in more than 1,000 wells in the northern High Plains of Colorado. Measurements for the 4 preceding winters are also included to serve as references illustrating declining or rising water levels. Records of 386 large-capacity wells (yields greater than 100 gpm) inventoried from 1971 through 1972 are tabulated. This table supplements 'Basic-Data Release No. 23' which includes records of all large-capacity wells inventoried before 1971. (Woodard-USGS)
W73-08745

GEOLOGIC AND HYDROLOGIC MAPS FOR LAND-USE PLANNING IN THE CONNECTICUT VALLEY WITH EXAMPLES FROM THE FOLIO OF THE HARTFORD NORTH QUADRANGLE, CONNECTICUT,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 04A.
W73-08746

SUMMARIES OF STREAMFLOW RECORDS IN NORTH CAROLINA,
Geological Survey, Raleigh, N.C.
N. O. Thomas.
North Carolina Department of Natural and Economic Resources, Raleigh, Office of Water and Air Resources, 1973. 303 p, 1 plate, 30 ref.

Descriptors: *Streamflow, *Flow rates, *Gaging stations, *Hydrologic data, *North Carolina, Stream gages, River basins, Low flow, Peak discharge, Average runoff, Water yield, Basic data collections, Reviews, Computer programs, Water resources.
Identifiers: *Streamflow records (NC).

Summaries of daily streamflow records collected at continuous-record gaging stations in North Carolina include: tables of highest mean discharges for 1 day and for 3, 7, 15, 30, 60, 90, 120, and 183 consecutive-day periods for each water year ending September 30; lowest mean discharges for 1 day and for 3, 7, 14, 30, 60, 90, 120, and 183 consecutive-day periods for each climatic year ending March 31; and a duration-of-flow table for each water year and for the period of record. A computer program was utilized in preparing the summaries. The summaries were prepared for all active and discontinued streamgaging stations for which 5 or more water years of record were available as of September 30, 1968. Each set of summary tables is preceded by a station description giving the location of the gage and information on the station's operation. The summaries are fundamental in analyzing streamflow records. Further analyses and studies that may be undertaken to develop key long-term streamflow and runoff values needed in water-availability studies and in the design and management of water-related facilities are briefly described by reference to a few selected reports. The techniques employed in the reference reports are summarized. (Woodard-USGS)
W73-08747

SALINE GROUNDWATER RESOURCES OF MISSISSIPPI,
Geological Survey, Jackson, Miss.
G. J. Dalsin.

Descriptors: *Groundwater resources, *Saline water, *Water quality, *Chemical analysis, *Mississippi, Water wells, Aquifer characteristics, Dissolved solids, Water yield, Desalination, Projections, Water utilization, Hydrologic data, Maps.

This one-sheet atlas describes the saline groundwater resources of Mississippi. Saline groundwater occurs under all or most of the State of Mississippi and is a potentially important natural resource because it may someday be used for water supplies, either directly or after desalination. Also, as an aid in pollution control the less mineralized saline-water sections can serve as a buffer between the fresh-water section and the highly mineralized water section into which wastes may be injected. For these reasons the State has a policy of protecting from manmade pollution the aquifers containing water with less than 10,000 mg/liter of dissolved solids. A well of the size commonly constructed for public and industrial water supplies in the artesian aquifers of Mississippi can be expected to yield 25-30 gpm for each foot of water-level drawdown over a long period of continuous pumping. Chemical analyses of saline groundwater from selected wells are given in tables, and the wells are shown on maps. The water is a sodium bicarbonate type. (Woodard-USGS)
W73-08750

APPLICATION OF THE MOST-PROBABLE-NUMBER PROCEDURE TO SUSPENSIONS OF LEPTOSPIRA AUTUMNALIS AKIYAMI A,
North Carolina Univ., Chapel Hill. Dept. of Environmental Sciences and Engineering.
For primary bibliographic entry see Field 05A.
W73-08770

PRACTICAL CONSIDERATIONS FOR DIGITIZING ANALOG SIGNALS,
Alberta Univ., Edmonton. Dept. of Chemistry.
P. C. Kelly, and G. Horlick.
Analytical Chemistry, Vol. 45, No 3, p 518-527, March 1973. 10 fig, 3 tab, 13 ref.

Descriptors: *Sampling, *Data processing, Mathematical studies.
Identifiers: *Errors, *Analog to digital conversion, *Signal reconstruction, *Digitization, Precision, Regeneration.

Quantitative measures for the quality of digital data can be obtained by attempting to regenerate an analog signal from digital data. The resulting signal can be compared to the original analog signal. Regeneration may be carried out by use of simple operations on the Fourier transform of a continuous representation of digital data. The effects of sampling interval, sampling duration, quantization, digitization time, aperture time, and random variations in sampling interval are examined. The maximum sampling interval and minimum number of samples needed to digitize triangular, exponential, Lorentzian, and Gaussian peaks for given values of maximum absolute error are tabulated. (Little-Battelle)
W73-08791

TOOLS FOR COASTAL ZONE MANAGEMENT.
Marine Technology Society, Washington, D.C. Coastal Zone Marine Management Committee.
For primary bibliographic entry see Field 02L.
W73-08802

ENVIRONMENTAL GEOLOGIC ATLAS OF THE TEXAS COAST: BASIC DATA FOR COASTAL ZONE MANAGEMENT,
Texas Univ., Austin. Bureau of Economic Geology.
For primary bibliographic entry see Field 02L.
W73-08803

THE NATIONAL OCEAN SURVEY COASTAL BOUNDARY MAPPING,
National Ocean Survey, Rockville, Md. Coastal Mapping Div.
For primary bibliographic entry see Field 02L.
W73-08807

THE CHESAPEAKE BAY INVENTORY SYSTEM,
Johns Hopkins Univ., Baltimore, Md. Dept. of Radiology.
For primary bibliographic entry see Field 02L.
W73-08809

COASTAL ZONE MANAGEMENT SYSTEM: A COMBINATION OF TOOLS,
Center for the Environment and Man, Inc., Hartford, Conn.
For primary bibliographic entry see Field 02L.
W73-08810

THE MARINE ENVIRONMENT AND RESOURCES RESEARCH AND MANAGEMENT SYSTEM MERRMS,
Virginia Inst. of Marine Science, Glouster Point.
For primary bibliographic entry see Field 02L.
W73-08811

MARINE TECHNOLOGY TRANSFER DEPENDS UPON INFORMATION TRANSFER,
Environmental Protection Agency, Washington, D.C. Div. of Water Quality Standards.
For primary bibliographic entry see Field 02L.
W73-08812

1971 WATER RESOURCES DATA FOR NEW YORK: PART TWO, WATER QUALITY RECORDS.
Geological Survey, Albany, N.Y.

Geological Survey Basic Data Report, 1973. 254 p, 10 fig, 4 tab.

Descriptors: *Water quality, *Chemical analysis, *Surface water, *Groundwater, *New York, Water analysis, Water chemistry, Water resources, Sampling, Basic data collections, Sediment transport, Water temperature, Streamflow, Flow rates.

Water resources data for the 1971 water year for New York include records for the chemical and physical characteristics of surface water, groundwater and precipitation. These data represent that portion of the National Water Data System collected by the U.S. Geological Survey and cooperating state, local, and federal agencies in New York. Water quality information is presented for chemical quality, microbiology, water temperature, and fluvial sediment. Chemical quality includes concentrations of individually dissolved constituents and certain properties or characteristics such as hardness of water, specific conductance, and pH. Microbiological information includes quantitative identification of certain bacteriological indicator organisms. Data include a description of the sampling station and tabulations of the samples analyzed. The description of the sampling station gives location, drainage area, periods of record for the various water quality data, extremes of the pertinent data, and general remarks. (Woodward-USGS)
W73-08890

DRAINAGE AND FLOOD CONTROL BACKGROUND AND POLICY STUDY.
Nolte (George S.) and Associates, San Francisco, Calif.
For primary bibliographic entry see Field 04A.
W73-08891

DATA PROCESSING ESTIMATIONS FOR SAMPLE SURVEYS,
Georgia Univ., Athens.
A. Y-S. Huong.
Available from Univ. Microfilms, Inc., Ann Arbor, Mich. 48106. Order No. 73-5717. Ph D Dissertation, 1972. 150 p.

Descriptors: *Data processing, *Computer programs, *Regression analysis, Sampling, Statistical methods, Estimating.
Identifiers: *Data processing estimation, Variance, Covariance, Errors.

A new method for summarizing sample surveys called Data Processing Estimation is based upon a regression type estimation technique. This method, which generalizes many of the commonly used standard estimation procedures, utilizes regression relationships of the response variable on the vector of descriptive variables to estimate all unsampled units of the finite population and their corresponding sampling variance-covariances factors. As such, this approach allows these individual estimates to be processed so as to be able to evolve an estimate of the mean of any specified subpopulation by only averaging the sum of the sampled and unsampled units of this particular subpopulation. Since this technique also determines for each estimate the associated sampling error factors, an estimated variance of the estimated means can also be determined by simply processing the variances and covariances factors. The advantages of the technique are: the generality of the approach, the dynamic nature of the procedure and the simplicity of the estimation method. (Little-Battelle)
W73-08921

AERIAL REMOTE SENSING, A BIBLIOGRAPHY.
Office of Water Resources Research, Washington, D.C.
For primary bibliographic entry see Field 07B.
W73-08974

STREAMFLOW DATA USAGE IN WYOMING,
Wyoming Univ., Laramie. Water Resources Research Inst.
V. E. Smith.
Water Resources Series No 33, February, 1973. 9 p, 4 tab, 17 ref.

Descriptors: *Streamflow, *Hydrologic data, *Wyoming, *Surveys, *High-flow, Estimating, Planning, Stream gages, Networks, Low flow, Hydrologic systems, Forecasting, Mathematical models.
Identifiers: Data usage, Hydrologic networks, Streamflow observations, Peak flow data, Daily flows, Water availability.

To aid in future planning of hydrologic networks, a survey of federal, state, local government and private organizations was conducted to ascertain streamflow data, a principal hydrologic component, usage in Wyoming. Survey findings are discussed in detail. While several kinds of hydrologic studies are commonly made, high-flow studies are the most numerous. Of the 19 public agencies and two private firms that provide the input for these findings, all but five make high-flow studies; several make low-flow, water availability, or forecast studies as well or instead. Several models of runoff are in existance, but they are still in the development stage. Pointing to the need for more streamflow observations, numerous methods of estimating streamflow are used; the frequency of sue of these estimation methods is summarized. Since economic considerations will continue to be a constraint on any hydrologic network, estimations will continue therefore to be a necessary part of hydrologic studies. (Bell-Cornell)
W73-09004

A MODEL FOR SIMULATING TRANSPIRATION OF LEAVES WITH SPECIAL ATTENTION TO STOMATAL FUNCTIONING,
Agricultural Univ., Wageningen (Netherlands). Dept. of Theoretical Production Ecology.
For primary bibliographic entry see Field 02D.
W73-09039

FLOODS IN THE IOWA RIVER BASIN UPSTREAM FROM CORALVILLE LAKE, IOWA,
Geological Survey, Iowa City, Iowa.
A. J. Heinitz.
Geological Survey open-file report, February 1973. 75 p, 16 fig, 2 tab, 7 ref, 1 append.

Descriptors: *Floods, *Flood profiles, *Flood data, *Iowa, Flood damage, Flood control, Historic floods, Peak discharge, Streamflow, Gaging station, Hydrologic data, Basic data collections, Flow rates, Low flow engineering structures, Bridge design, Design criteria, Flow characteristics, Flood frequency.
Identifiers: *Iowa River basin.

Flood information is reported for 207 miles of the main stem, 23 miles on the West Branch, and 23 miles on the East Branch of the Iowa River. The information will be of use to those concerned with the design of bridges and other structures and the conduct of various operations on the flood plains of the streams. Included are flood-peak records, gaging-station records, and low-water profiles. Outstanding floods treated in this report are the 1954 flood which is the greatest known in the upper reaches of the Iowa River, the 1969 flood which is the greatest flood in recent years in the central reach of the river, and the 1947 flood which is the greatest flood recorded, excepting the 1918 historic flood, in the lower reaches of the river. Selected data are also given for the 1918 flood, the greatest flood recorded on the Iowa River. Flood profiles for the main stem include those for the 1947, 1954, 1969, the computed 25- and 50-year floods, and a partial profile for the June 1972 flood. (Woodard-USGS)
W73-09084

08. ENGINEERING WORKS

8A. Structures

CULVERT VELOCITY REDUCTION BY INTERNAL ENERGY DISSIPATORS,
Virginia Polytechnic Inst. and State Univ., Blacksburg.
For primary bibliographic entry see Field 08B.
W73-08514

UNDERGROUND NUCLEAR POWER PLANT SITING,
Aerospace Corp., San Bernardino, Calif.
For primary bibliographic entry see Field 06G.
W73-08617

RIVER JET DIFFUSER PLANNED.
For primary bibliographic entry see Field 05G.
W73-08631

AN ANALYSIS OF ENVIRONMENTAL STATEMENTS FOR CORPS OF ENGINEERS WATER PROJECTS,
Stanford Univ., Calif. Dept. of Civil Engineering.
For primary bibliographic entry see Field 06G.
W73-08673

ROUGE RIVER FLOOD CONTROL PROJECT. SECTION B FROM I-94 TO MICHIGAN AVENUE ALTERNATIVE NO. IV (SUPPLEMENT TO FINAL ENVIRONMENTAL IMPACT STATEMENT).

Available from National Technical Information Service, Springfield, Virginia, as EIS-MI-72-5462-S. Price: $4.25 in paper copy, $1.45 in microfiche. 1972. 42 p, 6 fig, 4 tab.

Descriptors: *Michigan, *Environmental effects, *Levees, *Flood control, Recreation, Engineering structures, Flood protection, Water quality control, Channel improvement, Wildlife habitat.
Identifiers: *Environmental Impact Statements, *Rouge River (Mich).

A study was undertaken to consider an optimized levee system and flood control plan for the Rouge River in Michigan. The levee protection system with associated interior drainage facilities is considered feasible from a structural engineering standpoint, and will be designed to provide protection against floods. The major benefit that would accrue from a levee project is the prevention of flood damages. Various recreational benefits would also be derived from the project. The project will have an adverse effect on the sewer systems because of the surcharging that would result. However, the project would preserve 19 acres of wildlife habitat, 5 acres of river, and 3 acres of woods. Alternative structural measures were considered to provide the same degree of protection as the proposed channel improvement plan. The adverse effects of such alternatives would be similar to those of the proposed project. In addition to the above information, numerous charts, graphs, illustrations, channel profiles, and economic evaluation summaries are included. (Mockler-Florida)
W73-08681

FLOOD CONTROL ON SAGINAW RIVER, MICHIGAN AND TRIBUTARIES; FLINT RIVER AT FLINT, SWARTZ, AND THREAD CREEKS (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Detroit, Mich.

Available from National Technical Information Service, as EIS-MI-72-5186-F. Price: $10.25 in paper copy, $1.45 in microfiche. May 12, 1972. 83 p, 9 map.

Descriptors: *Michigan, *Environmental effects, *Flood control, *Channel improvements, Flood protection, Biological communities, Channel flow, Stream improvement, Regulated flow, Water management (Applied), Water control, Excavation, Levees.
Identifiers: *Environmental Impact Statements, *Flint River (Mich).

This flood control project for the Flint River and Swartz and Thread Creeks, in Genesee County, Michigan, consists of channel realignments and modifications of approximately 11,000 feet of the main stem of the Flint River and of approximately 8,900 feet of Swartz and Thread Creeks. The completed project will provide flood protection for approximately 455 acres of land adjacent to the Flint River. This area, subject to periodic flooding, includes a concentrated industrial complex for automotive manufacturing and other commercial enterprises. The proposed actions would have an adverse impact upon the existing stream channels and the immediate, contiguous areas by displacing biological communities through the excavations and the construction of a concrete channel. Alternatives include not to continue with the proposed structural techniques. This would reduce the effectiveness of those segments already completed and would provide no further protection. (Mockler-Florida)
W73-08682

EDWARDS UNDERGROUND RESERVOIR, GUADALUPE, SAN ANTONIO, AND NUECES RIVERS AND TRIBUTARIES, TEXAS (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Fort Worth, Tex.

Available from National Technical Information Service, as EIS-TX-72-5323-F. Price: $6.25 in paper copy, $1.45 microfiche. November 19, 1971. 79 p, 1 tab.

Descriptors: *Texas, *Multiple purpose reservoirs, *Environmental effects, *Flood control, *Water supply, Flood protection, Levees, Irrigation, Reservoir storage, Recreation, Fish, Wildlife, Lakes, Wildlife habitats, Agriculture, Flood plains, Vegetation, Dams, Estuarine environment, Water importing, Archaeology, Dam construction, Flow control, River regulation, Groundwater resources, Groundwater recharge.
Identifiers: *Environmental Impact Statements, *Blanco River (Tex).

This project consists of a multiple purpose reservoir at Cloptin Crossing on the Blanco River in south central Texas. The reservoir would provide storage for flood control, municipal and industrial water supply, general recreation, and fish and wildlife enhancement. The impoundment created would inundate 6,060 acres of wildlife habitat and affect 1,670 additional acres of land by periodic inundation during flood control stages. Environmental impacts on the area, in addition to a reduction of flood damages and promotion of increased agricultural development in the flood plain, would include losses of natural stream, loss of natural vegetation and loss of wildlife habitats. This impact would be due to the construction of a dam, creation of a lake, and regulation of downstream flows. Curtailment of flows would deteriorate stream fish habitat. Adverse environmental effects might also include deterioration of coastal estuarine environment. Alternatives considered included other dam locations, water recycling, water importation, and no project. Since there are significant archeological values in the project area, the Department of Interior requested a study to determine possible adverse impact. (Adams-Florida)
W73-08684

SOUTH BRANCH, RAHWAY RIVER, NEW JERSEY, FLOOD CONTROL PROJECT, RAHWAY, NEW JERSEY (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, New York.

Available from National Technical Information Service, as EIS-NJ-72-5587-F. Price: $3.75 in paper copy, $1.45 in microfiche. May 1972. 30 p, 9 plate.

Descriptors: *New Jersey, *Environmental effects, *Flood control, Channel improvements, Land fills, Levees, Floodwalls, Flood protection, Check structures, Multiple-purpose projects.
Identifiers: *Environmental Impact Statements, *Rahway (NJ).

The project consists of construction of local flood protection facilities in Rahway. These flood protection facilities will include channel improvement, levees, floodwalls, land filling, a roadway bridge, and interior drainage facilities. A pump station will also be constructed. Beautification features are provided for in project plans. The project will result in the reduction of flood damage threat for a residential area that is presently planned as the site for an urban renewal project. Adverse environmental effects include construction disturbances and the loss of tidal mud flats. Alternatives to the proposed project include reservoir flood detention, greater emphasis on channel enlargement, providing no flood protection, and flood plain regulation measures. Implementation of the flood control improvements is essential to the program of urban redevelopment and many economic and social gains would accrue. (Mockler-Florida)
W73-08685

SANTA PAULA CREEK CHANNEL, VENTURA COUNTY, CALIFORNIA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Los Angeles, Calif.

Available from National Technical Information Service, U.S. Dep't. of Commerce, EIS-CA-72-5334-F. Price: $6.25 in paper copy, $1.45 in microfiche. March 1972. 37 p, 2 plate, 3 illus, 8 photo.

Descriptors: *California, *Environmental effects, *Channel improvements, *Flood protection, *Flood control, Water quality control, Recreation, Water pollution, Flood plain zoning, Water storage, Area redevelopment, Water control.
Identifiers: *Environmental Impact Statements, *Santa Paula Creek (Calif).

This flood control project on the Santa Paula Creek channel in Ventura County, California, would consist of the construction of two debris basins, one each on Santa Paula and Mud Creeks and construction of channel improvements along both creeks. The proposed project would provide protection for the city of Santa Paula and adjacent agricultural and urban areas from floods originating in the Santa Paula Creek drainage area. The recommended improvements would also protect the existing local water supply and provide for additional recreational facilities. The natural landscape would be altered. Other adverse environmental effects include loss of existing natural streambeds; increased requirements for water and sewer facilities; and increased air, water, and noise pollution caused by urbanization and other development. Alternatives to the project include the use of upstream locations, no action, flood plain management, and use of other concrete channel sections on Santa Paula Creek. (Mockler-Florida)
W73-08686

OLIVER BOTTOMS RESOURCE CONSERVATION AND DEVELOPMENT PROJECT, SEBASTIAN COUNTY, ARKANSAS (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Soil Conservation Service, Washington, D.C.
For primary bibliographic entry see Field 04D.
W73-08687

PEYTON CREEK, TEXAS--FLOOD CONTROL (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Galveston, Tex.

Available from National Technical Information Service, as EIS-TX-72-5006-F. Price: $6.00 in paper copy, $1.45 in microfiche. June 1972. 29 p, 7 tab.

Descriptors: *Texas, *Channel improvement, *Flood control, *River basin development, *Environmental effects, Controlled drainage, Soil conservation, Watersheds (Basins), Marsh management, Drainage effects, Agricultural runoff, Depositions (Sediments), Water pollution control, Aquatic environment, Watershed management, Sediment control, Dredging, Spoil banks, Water quality control.
Identifiers: *Environmental Impact Statements.

In the interest of flood control and drainage, this project proposes channel enlargement and the use of marshes as spoil areas in the Peyton Creek basin. The project would remove the threat of serious flooding in the urban area of Bay City, Texas, reduce flood damage to agricultural lands adjacent to the project, increase agricultural lands adjacent to the project, increase agricultural productivity by improved drainage, and help control future development with the designated floodway areas. The project would result in the conversion of about 82 acres of estuarine marsh area either for channel rights-of-way or placement of excavated material. There will be no significant effect on the water quality of Peyton Creek; there will be less sediment deposition in Lake Austin than is occurring presently. Channel enlargement and diversion channels in areas other than the proposed plan, along with a combination of non-structural improvements, were considered as alternatives; but they were felt to have no distinct developmental or environmental advantage over the recommended proposal. Comments from interested agencies expressed concern over the possibility of a deteriorating effect on the ecology in the lower reaches of Peyton Creek and Lake Austin. (Dunham-Florida)
W73-08688

FLOOD CONTROL PROJECT, THOMPSON'S CREEK, HOLLAND PATENT, NEW YORK (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, New York.

Available from National Technical Information Service, as EIS-NY-72-5285-F. Price: $3.25 in paper copy, $1.45 in microfiche. June 28, 1972. 15 p, 1 fig, 1 map.

Descriptors: *Flood control, *New York, *Channel improvement, *Drainage systems, *Environmental effects, Overflow, Planning, Flood damage, Flood protection, Flood proofing, Nonstructural alternatives, Cost-benefit ratio, Fish, Channels, Flood discharge, Diversion structures, Drainage programs, Culverts.
Identifiers: *Environmental Impact Statements, *Ninemile Creek Basin (NY).

This project consists of flood control improvements proposed for the Ninemile Creek Basin at Holland Patent, New York, necessitated by periodic overflow of Thompson's Creek, a tributary of Ninemile Creek which flows through Holland Patent. The overflowing affects approximately twelve acres of residential and commercial properties in the town. Since the principal cause of the overflow is the inadequate capacity of Thompson's Creek's channel, the proposed project will consist of the construction of a diversion channel from Thompson's Creek to Willow Creek and another waterway flowing through the town and having greater channel capacity. Other features of the project include culverts, drainage ditches and beautification measures. Implementation of the improvement will minimize future flood damage to the village, enhance land values, and will not significantly affect fish and wildlife resources in the area. Several alternatives were considered. Structural alternatives included impounding the flood discharges in a detention basin and diversion of flood discharges to Willow Creek. A nonstructural alternative considered was flood proofing. However, none of these alternatives is as economically efficient as the proposed project. (Adams-Florida)
W73-08689

CAMP GROUND LAKE, SALT RIVER BASIN, KENTUCKY (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Louisville, Ky.

Available from National Technical Information Service, as EIS-KY-72-5447-F. Price: $3.00 in paper copy, $1.45 in microfiche. September 1972. 24 p, 2 map, 1 append.

Descriptors: *Multiple purpose reservoirs, *Dam construction, *Kentucky, *Flood protection, *Environmental effects, Dams, Reservoirs, Ecology, Flooding, Recreation, Fish, Wildlife habitats, Flood damage, Flood plains, Flood plain zoning, Flood plain insurance, Flood control, Flood forecasting, Water supply, Stream flow, Alteration of flow, Channels, Non-structural alternatives, Project planning, Water quality control.
Identifiers: *Environmental Impact Statements, *Camp Ground Lake (Ky).

The Camp Ground Lake project, located in the Salt River Basin, Kentucky, would consist of construction of a multi-purpose reservoir comprised of a dam and appurtenances. Project purposes include flood control, water supply, water quality control, and general fish and wildlife recreation. By regulating the amount of water released from the dam during periods of flooding, the project would provide flood damage reduction to about 20,000 acres of downstream lands. At seasonal pool elevation, approximately 5,070 acres of land and 50 miles of free-flowing stream will be inundated by the project. Aquatic habitat will be altered from free-flowing to slack water, causing an adverse impact. Non-structural alternatives considered included evacuation, acquisition of flood prone lands, and flood plain zoning. Flood plain zoning would have minimal impact on the environment. However, responsibility for this method generally lies with state and local governments, and furthermore, it would have no effect on reducing damage to development in flood prone areas. Structural alternatives, such as levees, were also considered. All alternatives were considered economically infeasible, or confining to area development. (Adams-Florida)
W73-08690

PERRY COUNTY DRAINAGE AND LEVEE DISTRICTS NOS. 1, 2, AND 3, MISSOURI (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, St. Louis, Mo.

Available from National Technical Information Service as EIS-MO-72-5279-F. Price $4.25 in paper copy; $1.45 in microfiche. May 1972. 14 p.

Descriptors: *Missouri, *Environmental effects, *Flood control, *Mississippi River, *Drainage districts, Levee districts, Pumps, Drainage engineering, Drainage systems, Drainage programs, Flood protection, Flood damage, Levees, Flooding, Agriculture, Ditches, Annual flood, Cultivated lands, Wildlife habitats, Environmental effects, Non-structural alternatives.
Identifiers: *Environmental Impact Statements, *Perry County (Mo.), *Randolph County (Ill.).

A high degree of flood protection from the Mississippi River was provided by the Perry County Drainage and Levee Districts Numbers 1, 2, and 3, located in Perry County, Missouri, and Randolph County, Illinois, upon completion of the existing levee in 1968. However, repetitive and substantial flood damages have occurred in the area due to blocked drainage through the levee. This project concerns a proposed improvement, recommended as a modification of the existing levee project, which is designed to provide relief from interior flooding on the agricultural lands within the districts. The recommended plan of improvement consists of the construction of four pumping stations ranging in size from 60 c.f.s. to 130 c.f.s., and two new drainage ditches totaling 13,900 feet in length. Improvements will reduce the average area flooded annually from 5,850 acres to 2,420 acres. With better drainage, some of the districts' 280 acres of scattered tracts of brush and forest land may eventually be converted to cropland. Since the area consists of highly developed agricultural land, there is a minimal wildlife population and the improvement will have little adverse effect on ecological systems in the districts. (Adams-Florida)
W73-08691

PRESENT DAY ENGINEERING CONSIDERATIONS AS APPLIED TO WATER LINE DESIGN,
Woolpert (Ralph L.) Co., Dayton, Ohio.
J. A. Herman.
Paper presented at American Water Works Association Annual Conference, Denver, Colorado, 1971. 26 p, 10 fig, 1 tab, 4 ref.

Descriptors: *Pipelines, *Water conveyance, *Municipal water, *Design criteria, *Water distribution (Applied), Water supply, Water delivery, Water requirements, Water works, Underground structures, Tunnels.

The design of a water line, or a system of water lines, includes many factors such as the following: peak flow rates generated by maximum instantaneous usages of water, types of materials to be utilized in the construction of the pipelines, desired ranges of system operating pressures, allowable losses of head as determined by flow velocities and pipe characteristics, types of joints to be utilized, possible effects of corrosion to the pipeline, the restraint of thrust in pipelines, etc. The application of design criteria has not changed greatly during the past few decades but conditions and environments for water lines have changed considerably from the past. Two such problems are peak system demand and thrust restraint. Peak demand is rising ever faster, especially in predominately residential areas, where lawn watering, air conditioners, etc., require more water than in the past. Large industries, although they demand large quantities of water, reduce the ratio of peak flow to average flow due to their continuous operation. Thrust-restraint of pipelines is an important consideration with the changing environmental conditions being imposed on all utilities, especially with utility tunnels and corridors. More positive restraints will be needed than are in use today. (Poertner)
W73-08896

TREATMENT EFFICIENCY OF WASTE STABILIZATION PONDS,
South Dakota School of Mines and Technology, Rapid City.
For primary bibliographic entry see Field 05D.
W73-09001

8B. Hydraulics

PLANS FOR REDUCTION OF SHOALING IN BRUNSWICK HARBOR AND JEKYLL CREEK, GEORGIA,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
F. A. Herrmann, Jr., and I. C. Tallant.
Available from NTIS, Springfield, Va., 22151, as AD-751-749 Price $3.00 printed copy; $1.45 microfiche. Technical Report H-72-5, September 1972. 202 p, 16 fig, 117 plate, 15 photo, 13 tab, 2 append.

Descriptors: *Harbors, *Navigation, *Channel improvement, *Georgia, *Coastal engineering, Model studies, Design criteria, Estuaries, Data collections, Atlantic Ocean, Engineering structures, Environmental effects, Tidal effects, Sand bars, Channel morphology, Shoals.
Identifiers: *Brunswick Harbor (Ga), *Jekyll Creek (Ga), *Shoaling reduction.

A fixed-bed model of Brunswick Harbor area, Georgia constructed to scales of 1:500 horizontally and 1:100 vertically, reproduced approximately 67 square miles. The model was equipped with the necessary appurtenances for the accurate reproduction of tides, tidal currents, shoaling patterns, and other significant prototype phenomena. The model study tested the effectiveness of proposed plans for the reduction of shoaling in Brunswick Harbor and Jekyll Creek. Closure of the East River channel was the only scheme tested which could effect significant reduction of shoaling. Schemes to increase current velocities or turbulence were unsuccessful in reducing channel shoaling in the critical reach of East River. Deepening the navigation channel from 30 ft to 36 ft will reduce shoaling in East River and increase shoaling in Turtle and Brunswick Rivers, even if no additional improvement works are constructed. A plan consisting of 10,150 ft of impermeable training walls was developed for reducing shoaling in Jekyll Creek. This reduced overall shoaling in the channel and shifted substantial amounts of shoal material from areas of high-cost maintenence to areas of low-cost maintenance. Dye dispersion tests were conducted in the model to determine the dispersion of wastes from the Brunswick Pulp and Paper Company into Turtle River and from the Brunswick sewage treatment plant into Academy Creek. (Woodard-USGS)
W73-08512

UNIT STREAM POWER AND SEDIMENT TRANSPORT,
Illinois Univ., Urgana.
C. T. Yang.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 98, No HY10, p 1805-1826, Oct 1972. 9 fig, 3 tab, 28 ref, 3 append.

Descriptors: *Sediment transport, *Concentration, *Sediment discharge, *Statistical analysis, *Alluvial channels, Hydraulics, Sediments, Rivers, Open channel flow, Open channels, Sediment load, Turbulence, Particle size, Velocity, On-site data collections, Laboratory tests, Bibliographies.
Identifiers: Bed profiles, Unit stream power, Water surface profiles, Test results.

Sediment transport equations previously used often provided misleading results because of unrealistic assumptions made in their derivation. Unit stream power, defined as the time rate of potential energy expenditure per unit weight of water in an alluvial channel, is shown to dominate the total sediment concentration. Statistical analyses of 1225 sets of laboratory flume data and 50 sets of field data indicate the existence and generality of the linear relationship between the

logarithm of total sediment concentration and the logarithm of the effective unit stream power. The coefficients in the proposed equation are shown as being related to particle size and water depth, or particle size and width-depth ratio. An equation generalized from Gilbert's data can be applied to natural streams for accurately predicting total sediment discharge. (USBR)
W73-08513

CULVERT VELOCITY REDUCTION BY INTERNAL ENERGY DISSIPATORS,
Virginia Polytechnic Inst. and State Univ., Blacksburg.
J. M. Wiggert, and P. D. Erfle.
Concrete Pipe News, Vol 24, No 5, p 87-94, Oct 1972. 10 fig, 4 tab.

Descriptors: *Culverts, Energy dissipation, Onsite tests, Obstruction to flow, Hydraulic jump, Laboratory tests, Concrete pipes, Plastic pipes, *Design criteria, Velocity, Graphical analysis, Turbulent flow.
Identifiers: *Energy dissipators, Tumbling flow, Test results, Roughness projections, Spacing, Rings, *Critical slopes, Free flow, Critical depth.

Laboratory and field studies were made on culverts on steep slopes to develop parameters for design of internal energy dissipators. The purpose was to eliminate the need for costly outlet structures. The report describes free flow and full flow conditions for culverts on 3 steep slopes with inlet control. Laboratory tests confirmed in the field showed that 4 annular rings properly spaced in the culvert would produce tumbling flow and the required dissipation of energy. Air entrained at the inlet because of vortex action had an insignificant effect on capacity. Larger diameter pipe is needed for free flow design to compensate for the rings, but for full flow design, no increase in pipe diameter is required. The suggested design is based on 1 large ring followed by 3 smaller ones, with double spacing between the large ring and the first smaller one. Laboratory tests were made in a 6-in.-dia plastic pipe, and field tests in an 18-in.-dia concrete pipe. Tables, graphs, and a nomograph summarize the test data, and provide aids to design. Two sample problems are solved in step-by-step detail. (USBR)
W73-08514

CONTROL OF SURGING IN LOW-PRESSURE PIPELINES,
Bureau of Reclamation, Denver, Colo.
J. J. Cassidy.
Report REC-ERC-72-28, Sept 1972. 35 p, 27 fig, 3 tab, 8 ref, append.

Descriptors: *Closed conduit flow, *Surges, Onsite tests, Hydraulic gradient, Graphical analysis, Pipelines, Pipe flow, Pipe tests, Flow, Hydraulic transients, Head losses, Mathematical studies, Darcy-Weisbach equation, Unsteady flow, Computer programs, Fluid mechanics, Hydraulic design.
Identifiers: *Pipeline surges, Canadian River Project (Tex), Computer-aided design.

Pipelines designed for a hydraulic gradient nearly parallel to the ground profile are inherently underdamped when operating at less than design discharge. Consequently, any unsteadiness in the flow may be amplified, depending upon the characteristics of the system. The study was performed to establish parameters for use in design of low-pressure pipe systems by predicting amplitude and frequency of unsteady flow occurring at flow rates below the design value. A system must be designed so that small disturbances in one reach are not amplified in a succeeding reach; when the natural period of a downstream section exceeds the period of the incoming disturbance by a factor of 1.43, then incoming surges are not likely to occur. An analytical study of surge dynamics was conducted. Tabulations display the results, and numerous curves are given to show dimensionless discharge variations versus a function of dimensionless time and dimensionless discharge cutback ratio. Others show surge amplitudes as a function of a resistance coefficient. An appendix gives computer programs for dimensionless aqueduct parameters and surge characteristics. (USBR)
W73-08522

HEATED DISCHARGE FROM FLUME INTO TANK - DISCUSSION,
Vanderbilt Univ., Nashville, Tenn. Dept. of Environmental and Water Resources Engineering.
B. A. Benedict.
Journal of the Sanitary Engineering Division, American Society of Civil Engineers Vol 97, No. SA4, p 537-540, August 1971. 2 fig, 3 ref.

Descriptors: *Jets, *Heated water, *Temperature, *Velocity, Laboratory tests, Water temperature, Mathematical models, Mixing, Entrainment, Distribution patterns.
Identifiers: Flow establishment zone, Boussinesq assumption.

The original article by H. Stefan (See W71-05132) is timely experimental evidence, since the motion of heated discharges into lakes and rivers is of real concern to environmentalists. Of particular value is the measurement of the velocity field as well as the temperature field. The discussion concentrates on the reported data for the decline of center line surface water temperature. A form of the Motz-Benedict model is applied to these data to yield added insight into the problem. It follows from the graphical presentation that the theoretical results fit the data reasonably well. It appears that an entrainment mechanism is generally adequate to describe centerline decay of a discharge into the tank. It may not then be so necessary to consider different zones of discharge. The author also points out the importance of differentiating between the basic entrainment mechanisms for stagnant and flowing ambient streams. (Oleszkiewicz-Vanderbilt)
W73-08610

A NEW TYPE OF WATER CHANNEL WITH DENSITY STRATIFICATION,
Johns Hopkins Univ., Baltimore, Md. Dept. of Mechanics and Materials Science.
For primary bibliographic entry see Field 05B.
W73-08615

A TEMPERATURE ADJUSTMENT PROCESS IN A BOUSSINGESQ FLUID VIA A BUOYANCY-INDUCED MERIDIONAL CIRCULATION,
Kyoto Univ. (Japan). Dept. of Aeronautical Engineering.
T. Sakurai, and T. Matsuda.
Journal of Fluid Mechanics, Vol 54, part 3, p 1-6, August 1972. 4 ref.

Descriptors: *Buoyancy, *Temperature, *Hydraulics, Fluid mechanics, Laboratory tests, Mathematical models, Mathematical studies.
Identifiers: *Boussinesq fluid, Prandtl Number.

The existence of a new time scale expressed by means of Prandtl number, the thermometric conductivity, a typical length and the Brunt-Vaisala frequency, is clarified for a temperature adjustment process of a Boussinesq fluid in a circular cylinder. Relevant physical processes are discussed together with the in-depth mathematical treatment of the subject. (Oleskiewicz-Vanderbilt)
W73-08616

EVALUATION OF COASTAL ZONE MANAGEMENT PLANS THROUGH MODEL TECHNIQUES,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 02L.
W73-08813

HYDRAULIC MODELING OF AN ENVIRONMENTAL IMPACT: THE JAMES ESTUARY CASE,
Virginia Inst. of Marine Science, Gloucester Point.
For primary bibliographic entry see Field 02L.
W73-08814

GRAYS HARBOR ESTUARY, WASHINGTON: REPORT 4, SOUTH JETTY STUDY,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
N. J. Brogdon, Jr.
Available from NTIS, Springfield, Va 22151 as AD-749 257, Price $6.00 printed copy; $1.45 microfiche. Technical Report H-72-2, September 1972. 300 p, 260 plate, 16 photo, 4 tab.

Descriptors: *Engineering structures, *Coastal engineering, *Harbors, *Jetties, *Washington, Navigation, Shore protection, Breakwaters, Model studies, Design criteria, Planning, Estuaries, Tidal effects.
Identifiers: *Grays Harbor Estuary (Wash).

This is the fourth report in a series to be published on the results of model tests on the Grays Harbor, Washington, Estuary model conducted for the Army Engineer District, Seattle. This study was conducted during the period November 1970 to June 1971. The entrance to the harbor is protected by two converging stone jetties which are about 1.23 miles apart at their outer ends. The condition of the south jetty influences the stability of Point Chehalis and the surrounding areas. The conclusions and plans developed during the previous model study were put into effect and did result in stabilizing Point Chehalis. The navigation channel, however, continued to migrate south until the south jetty is now in danger of being undermined. For the tests in this report the entire model was in a fixed-bed condition. The model was constructed to linear scales of 1:500 horizontally and 1:100 vertically, which resulted in the following model-to-prototype scales based on the Froudian relations: velocity 1:10, time 1:50, discharge 1:500,000, volume 1:25,000,000, and slope 5:1. The salinity scale was 1:1. As a basis for selecting the best south jetty plan, hydraulic, salinity, dye dispersion, and shoaling characteristics were investigated. (Woodard-USGS)
W73-08889

STABILITY OF ROTATIONAL COUETTE FLOW OF POLYMER SOLUTIONS,
Delaware Univ., Newark. Dept. of Chemical Engineering.
M. M. Denn.
American Institute of Chemical Engineers Journal, Vol 18, No 5, p 1010-1016, September 1972. 2 fig, 1 tab, 18 ref.

Descriptors: *Rheology, *Viscosity, *Critical flow, *Aqueous solutions, *Rotational flow, Turbulence, Vortices, Shear stress.
Identifiers: Taylor number, Secondary flow, *Polymer solutions.

The onset of secondary flow between rotating cylinders (Taylor vortices) was observed for a dilute polymer solution whose viscometric flow properties were characterized rheogoniometrically. The critical Taylor number was predicted accurately by linear stability theory with a stress constitutive equation describing viscous behavior. The cell spacing differed significantly from that predicted by linear theory. A nonlinear analysis shows that linear theory will predict the ultimate cell size only for an inelastic liquid. For an elastic liquid, closer spacing is a lower energy configuration than the linear theory spacing. This is consistent with experiment. (Knapp-USGS)
W73-09100

8C. Hydraulic Machinery

EDMONSTON PUMPING PLANT: NATION'S MIGHTIEST,
California State Dept. of Water Resources, Sacramento.
R. B. Jansen.
Civil Engineering, Vol 42, No 10, p 67-71, Oct 1972. 4 fig, 5 photo.

Descriptors: *Pumping plants, *Pumps, Pumping, Hydraulic machinery, Seismic design, Surge tanks, Structural design, Mechanical equipment, Electric motors, Electrical equipment, Discharge lines, Control, California, Structural engineering, Automatic control, Manual control, Design criteria, Hydraulic design, Remote control.
Identifiers: *High head, A. D. Edmonston Pump Plant (California), California Water Plan, Earthquake zones.

The Edmonston pumping plant, a key element in the California Water Project, lifts Northern California water over the Tehachapi Mountains north of Los Angeles. With a discharge capacity of 4410 cfs and a lift of 1926 ft, this plant is the Nation's largest in combined lift and capacity. The special 4-stage European-type pumps selected for this plant are described. Each pump has a capacity of 315 cfs, requiring an 80,000-hp synchronous motor, for a total power requirement for all 14 pumps of more than 1 million hp. The unique motor-starting features are discussed. The pumping operation is computer- or operator-controlled from the plant room and, ultimately, can be controlled from a remote Area Control Center. As a precautionary measure against earthquake hazards prevelant in this area, structures were designed for a seismic acceleration of 0.5 g. The surge tank, a key feature of the discharge system, is described. (USBR)
W73-08523

ELECTRICAL EFFECTS OF AC TRANSMISSION LINES ON PIPELINES,
Corrosion Control Technologists, Houston, Tex.
M. A. Riordan.
Materials Protection Performance, Vol 11, No 10, p 26-31, Oct 1972. 4 fig, 3 tab, 13 ref.

Descriptors: *Pipelines, *Induced voltage, *Alternating current, Safety, Transmission lines, Hazards, Electric fields, Electrical faults, Ground currents, Corrosion, Electrical grounding.
Identifiers: Potential gradients, Electric shock, *Induced currents, Ground return, Earth resistivity (Electrical).

A metallic pipeline represents a single-line conductor and as such will respond to the electrical field when a pipeline is located near an overhead power transmission line. As the availability of easements decreases, coexistence of powerlines and pipelines increases. With parallel coexistence, electrical exposures may develop dangerous voltages on the metallic portions of the pipeline system. Since pipelines are usually undergound, they are not as responsive as aerial cable to inductive effects from transmission lines, but may be more responsive to ground voltage effects during fault conditions on the transmission lines. The pipeline engineer should be aware of these electrical influences that could develop into undesirable conditions; both human exposure and mechanical hazards must be considered. Human tolerances, fault conditions, modes of energy transfer, normal and abnormal powerline operation, and the magnitude of induced voltages are discussed with respect to pipeline safety for installation, operation, and maintenance. (USBR)
W73-08524

PROPOSED NEW LOCK--PICKWICK LANDING DAM (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Tennessee Valley Authority, Chattanooga.

Available from the National Technical Information Service $3.25 in paper copy, $1.45 in microfiche. Tennessee Valley Authority, Office of Health and Environmental Science, TVA-OHES-EIS-72-7, September 13, 1972. 17 p.

Descriptors: *Tennessee, *Tennessee River, *Tennessee Valley Authority, *Locks, *Environmental effects, Navigation, Navigable rivers, Dams, Dam construction, Concrete structures, Damsites, Excavation, Federal project policy, Federal government, Administrative agencies, Water pollution, Natural resources, Transportation, Dredging, Turbidity.
Identifiers: *Environmental Impact Statements, Water traffic control.

The proposed project is the construction and operation of a new main lock at Pickwick Landing Dam in Hardin County, Tennessee. The new lock will improve conditions for water traffic and reduce congestion and the possibility of accidents. The site is part of the present dam reservation and was provided for the proposed lock in the original design of the dam. The environmental impact involves excavation of some 2.7 million cubic yards of earth and rock, including some 450,000 cubic yards of dredging, the disposal of excavated material on low-lying land near the lock, and the placement of about 425,000 cubic yards of concrete. Adverse impacts include a temporary increase in turbidity in the Tennessee River and the temporary loss of about 30 acres of wildlife habitat. Extension of the existing lock and development of bypass methods were considered as alternatives. (Dunham-Florida)
W73-08692

DEEP ROTARY CORE DRILLING IN ICE,
Cold Regions Research and Engineering Lab., Hanover, N.H.
For primary bibliographic entry see Field 02C.
W73-09079

8D. Soil Mechanics

FOUNDATION AND ABUTMENT TREATMENT FOR HIGH EMBANKMENT DAMS ON ROCK.
American Society of Civil Engineers, New York. Committee on Embankment Dams and Slopes.
For primary bibliographic entry see Field 08E.
W73-08515

ENVIRONMENTAL DEFENSE FUND, INC. V. ARMSTRONG (ACTION FOR INJUNCTIVE AND OTHER RELIEF WITH RESPECT TO THE NEW MELONES DAM PROJECT).
For primary bibliographic entry see Field 06E.
W73-08706

8E. Rock Mechanics and Geology

LOCATION OF SOLUTION CHANNELS AND SINKHOLES AT DAM SITES AND BACKWATER AREAS BY SEISMIC METHODS: PART I--ROCK SURFACE PROFILING,
Kentucky Water Resources Inst., Lexington.
V. P. Drnevich.
Available from the National Technical Information Service as PB-220 063, $3.00 in paper copy, $1.45 in microfiche. Research Report No 54, 1972. 45 p, 14 fig, 11 ref, 2 append. OWRR A-026-KY (3), 14-31-0001-3217.

Descriptors: *Seismic studies, *Subsurface investigations, *Bedrock, Profiles, Subsurface mapping, Borehole geophysics, Computer programs, Model studies.

Sledge hammer seismic refraction surveys and a modified version called downhole shooting are useful for rock surface profiling. Advantages of downhole shooting are calibration at the end points of the survey, measurement of vertical wave propagation velocities directly, and having a refracted wave ray path for almost the entire survey length. The downhole method was simulated with the digital computer. The method can handle any rock surface profile and generates corresponding travel time curves for the forward and reverse profile surveys. This program was used to study the effects of anomalies on the travel time curves. A method of data reduction was developed that enables an estimate of the rock surface profile to be made from the travel time data. Field tests were performed at four sites having soil and rock characteristics different from each other. Rock surface profiles were estimated from the travel time curves using the procedure developed and these were compared with the depth to rock by proof drilling. The sources of error and some limitations of use are discussed. For the sledge hammer method to be used for rock surface profiling, the rock surface should be within 25 to 30 ft of the soil surface and the minimum width of solution channel that can be sensed with this method is on the order of two feet. (See also W73-08467) (Knapp-USGS)
W73-08466

LOCATION OF SOLUTION CHANNELS AND SINKHOLES AT DAM SITES AND BACKWATER AREAS BY SEISMIC METHODS: PART II--CORRELATION OF SEISMIC DATA WITH ENGINEERING PROPERTIES,
Kentucky Water Resources Inst., Lexington.
For primary bibliographic entry see Field 07B.
W73-08467

FOUNDATION AND ABUTMENT TREATMENT FOR HIGH EMBANKMENT DAMS ON ROCK.
American Society of Civil Engineers, New York. Committee on Embankment Dams and Slopes.

Journal of the Soil Mechanics and Foundations Division, American Society of Civil Engineers, Vol 98, No SM10, p 1115-1128, October 1972. 4 tab.

Descriptors: *Dam foundations, *Abutments, *Rock foundations, Grout curtains, Earth dams, Rockfill dams, Treatment, Excavation, Grouting, Instrumentation, Topography, Geologic investigations, Slopes, Cutoffs, Dam construction, Foundations, Foundation investigations, Dam design, Design practices, Surface, Drainage.
Identifiers: Surface treatment, Surface preparation, Site selection.

Current and past practices of abutment and foundation treatment for high embankment dams founded on rock are reviewed. Organizations contributing information on 23 dams include: Bechtel Corp, British Columbia Hydro and Power Authority, Harza Engineering Company, Snowy Mountains Authority, State of California Department of Water Resources, Bureau of Reclamation, and US Army Corps of Engineers. Topics include: (1) geology and topography of the abutments and foundations--rock treatment and dam location and design, (2) excavation of the abutment and foundation areas--permissible slopes and quality of acceptable rock surfaces for both core and shell portions of the dam, (3) foundation preparation, including methods for normal and poor rock treatment, drainage, and grouting, and (4) adequacy of abutment and foundation treatment. (USBR)
W73-08515

TERRESTRIAL SURVEYING AND GEOLOGICAL MAPPING OF THE ROCK FACE OF THE DEWATERED AMERICAN NIAGARA FALLS,
Department of the Environment, Ottawa (Ontario). Inland Waters Branch.
For primary bibliographic entry see Field 07C.
W73-08727

8F. Concrete

THE WINDSOR PROBE,
Gulick-Henderson Labs., Inc., Whitestone, N.Y.
L. D. Long, and C. Gordon.
Paper presented to American Concrete Institute Seminar, Atlanta, Georgia, Sept 1972. 5 p.

Descriptors: *Probes (Instruments), *Concrete technology, Compressive strength, *Nondestructive tests, *Concrete tests, Test equipment, Test procedures, Hardness tests, Quality control, Inspection, On-site tests, Aggregates, Coarse aggregates, Concretes, Concrete mixes, Materials testing.
Identifiers: *Windsor probe test system, *Probes (Instruments).

The recently developed Windsor probe is considered by some to be one of the most reliable nondestructive methods of measuring concrete strength in a structure. The probe measures compressive strength by the resistance of the mortar and by the force required to shatter a piece of coarse aggregate. This instrument, if used correctly within its limits, is a convenient and valuable tool. A favorable feature is that the probe can be left in place, if required. Factors affecting concrete strength, such as size, type, amount, mix, and condition of the aggregates, which may not be reflected by probe tests, should be considered when using the probe. Operator qualifications include: (1) experience in the use of this instrument, (2) expertise in concrete technology, (3) capable of sight recognition of commonly used aggregates, and (4) ability to test and identify such aggregates. (USBR)
W73-08517

CONCRETE NONDESTRUCTIVE TESTING,
Law Engineering Testing Co., Birmingham, Ala.
R. Muenow.
Paper presented at American Concrete Institute Seminar, Atlanta, Georgia, Sept 1972. 21 p.

Descriptors: *Nondestructive tests, *Concrete tests, *Test equipment, *Test procedures, *Concrete technology, Electrical properties, Magnetic properties, Electrical resistance, Sound waves, Materials tests, Quality control, Inspection, On-site tests.
Identifiers: Resonance frequency method, Sonic devices, Ultrasonic tests, Nuclear density meters, Radiographic inspection, Infrared spectroscopy.

Because of tradition, outdated quality control techniques are still used even though useful information is no longer derived. Today, many new methods of testing are available for obtaining information about construction materials or the condition of structures without destroying any part of them. Now, properties of materials in a structure can be measured, flaws and early signs of deterioration detected, and tests performed more quickly and accurately. The operating principles and uses of 8 unusual instruments in facilitating construction repairs are reviewed. Methods described are: (1) nuclear activation and absorption, (2) low-frequency ultrasonics, (3) resonant frequency, (4) radiographic or isotope, (5) infrared, (6) inspection of steel by magnetic or electrical methods, (7) piling inspection, and (8) sonic emission. (USBR)
W73-08519

EVALUATION OF LOW STRENGTH CONCRETE,
Law Engineering Testing, Co., Birmingham, Ala.
F. A. Kozeliski.
Paper presented at American Concrete Institute Seminar, Atlanta, Georgia, September 1972. 5 p, 6 ref.

Descriptors: *Concrete tests, *Non-destructive tests, *Compressive strength, Concrete technology, Concretes, Test equipment, Test procedures, Materials tests, Inspection, Quality control, On-site tests, Electronic equipment, Concrete mixes, Evaluation.
Identifiers: *Pulse velocity tests, *Soniscopes, Pulse generators, Pulse method, Sonic velocity, Transducers.

The soniscope with transducers is one of the most acceptable methods of nondestructive testing of concrete. With this method the pulse velocity of the concrete is measured to evaluate the strength and workmanship of concrete throughout the structure. The pulse velocity method is an accepted ASTM procedure under ASTM designated C597-71. Description of the apparatus and the method of measuring the pulse velocity are presented. Some factors affecting the pulse velocity are: (1) cement content, (2) type of aggregate, (3) age of concrete, and (4) curing temperature. The soniscope can also be used in the field to monitor concrete strength development, determine acceptable times to remove formwork, and to transfer prestress forces to concrete. Other uses include evaluating quality control of concrete placement, construction workmanship, and the strength of old buildings. (USBR)
W73-08525

DUCTILITY OF REINFORCED CONCRETE COLUMN SECTIONS IN SEISMIC DESIGN,
Canterbury Univ., Christchurch (New Zealand).
R. Park, and R. A. Sampson.
Journal of the American Concrete Institute, Proceedings, Vol 69, No 9, p 543-551, Sept 1972. 5 fig, 1 tab, 17 ref, append.

Descriptors: *Columns, *Earthquake-resistant structures, *Reinforced concrete, *Structural design, Bibliographies, Deformation, Reinforcing steels, Seismic design, Concrete structures, Theoretical analysis.
Identifiers: Curvature, New Zealand, Axial loads, Eccentric loading, Limited design, Spirals, Stress-strain curves.

Ductility required of eccentrically loaded reinforced concrete column sections in seismic design is discussed. A method is suggested for determining the amount of special transverse steel required for ductility. The method is based on a theoretical study using stress-strain curves for concrete confined by rectangular hoops and for steel including the effect of strain hardening. Factors considered were: (1) required ultimate curvature, (2) level of axial load, (3) longitudinal steel content, and (4) material strengths. Present code recommendations for transverse steel may be less than appropriate in some instances of high axial load and low longitudinal steel content, and could be relaxed in others. (USBR)
W73-08526

8G. Materials

LOCATION OF SOLUTION CHANNELS AND SINKHOLES AT DAM SITES AND BACKWATER AREAS BY SEISMIC METHODS: PART I--ROCK SURFACE PROFILING,
Kentucky Water Resources Inst., Lexington.
For primary bibliographic entry see Field 08E.
W73-08466

THE CORROSION ENGINEER'S LOOK AT STRESS CORROSION,
Texas Univ., El Paso.
D. P. Redzie, and F. E. Rizzo.
Mater Prot Performance, Vol 11, No 10, p 53-56, Oct 1972. 4 fig, 2 tab, 20 ref.

Descriptors: *Corrosion, *Brittle fractures, Cathodic protection, Heat treatment, Bibliographies, Failure, Corrosion control, Cracking, Tensile stress, Fabrication, Time, Materials engineering, Materials testing.
Identifiers: *Stress corrosion, *Brittle fractures, Ion concentration, Notch effect, Microstructure, Stress concentration, Materials failure.

Stress corrosion cracking can occur in almost all engineering materials. Recent research indicates that failure is continuous on a seconds time scale. Failure takes place in a brittle rather than a ductile fashion, and is usually perpendicular to the load. The characteristic appearance includes a lack of deformation with relatively small amounts of general corrosion; at the microscopic level, it can be transangular or intergranular. Stress corrosion cracking is more probable as the strength of a material increases, is related to heat treatment and fabrication, and is dependent upon a specific ion whose concentration may be low. Time to failure is decreased by: (1) using a susceptible alloy, heat treatment, or fabrication method; (2) presence of cuts, sharp corners, or notches; (3) high concentrations of the specific ion; and (4) high stress levels. Stress corrosion cracking can be avoided by eliminating a susceptible material, a specific environment, time, or tensile stress. Cathodic protection can also be used to control stress corrosion cracking. No unified theory of stress corrosion cracking has been accepted by workers in the field. (USBR)
W73-08516

IMPROVED CORROSION RESISTANCE, RELIABILITY, AND INTEGRITY OF CAST STAINLESS ALLOYS,
Duriron Co., Inc., Dayton, Ohio.
W. A. Luce, M. G. Fontana, and J. W. Cangi.
Corrosion, Vol 28, No 4, p 115-128, Apr 1972. 11 fig, 4 tab, 4 ref.

Descriptors: *Alloys, Castings, Materials, Moldings, Stainless steel, Interfaces, Graphical analysis, Applied research, Laboratory tests.
Identifiers: *Cast metals, *Corrosion resistance, Carburizing, Cast steel, Carbon steel, Corrosion tests, Accelerated tests.

Lower carbon content improves general corrosion resistance of stainless alloys and minimizes susceptibility to intergranular attack. Producers of alloy castings have the problem of surface carburization occurring at the metal-mold interface when the mold contains organic or carbonaceous material. The study was undertaken to: (1) define the nature and extent of surface carburization occurring on stainless steel alloy castings poured in carbon-containing and carbon-free mold environments, and (2) determine effects of surface carburization on corrosion rate. Carbon enters liquid metal by gaseous transfer or direct contact with carbon or carbide residues. A carbon concentration gradient is established at the metal-mold interface. Castings were made in resin shell, ceramic, and green sand molds. Chemical composition was determined from samples cut from the flanges. Results are given for CF-3, CF-8, and CN-7M castings. Numerous electron microscope photographs of casting surfaces and graphs of carbon profiles are included. The degree of carburization and reduction in corrosion resistance were more pronounced in the CF-3 than the other 2 alloys. Carburization is inversely proportional to alloy carbon content. Green sand and ceramic molds impart little carbon to the casting. Pronounced carburization may occur with resin shell molds. (USBR)
W73-08518

CONCRETE NONDESTRUCTIVE TESTING,
Law Engineering Testing Co., Birmingham, Ala.
For primary bibliographic entry see Field 08F.
W73-08519

8I. Fisheries Engineering

OBSERVATIONS REGARDING SOME MORPHOLOGICAL AND BIOCHEMICAL MODIFICATIONS IN POND CARP (CYPRINUS CARPIO L.) DURING THE WINTER, (IN RUMANIAN),
O. Gheracopol.
Stud Cercet Piscic Inst Cercet Project Aliment. 4: p 253-271. 1971. Illus. English summary.
Identifiers: *Fish physiology, Biochemistry, *Carp, Cyprinus carpio, Modifications, Morphology, *Winter.

A comparative study was made on the Galitzian and the Lausitz carp concerning their body depth, condition and thickness coefficient, weight, fat, water, mineral salts, caloric value and caloric coefficient during the winter period. The Galitzian carp showed better tolerance to winter conditions than its Lautsitz counterpart.--Copyright 1972, Biological Abstracts, Inc.
W73-08520

HYDROBIOLOGICAL SYSTEM OF BREEDING PONDS WITH DIFFERENT FERTILIZATION METHODS AND DIFFERENT DENSITIES OF STOCKING WITH CARP (IN RUSSIAN),
L. A. Erman, Ya. S. Krauyalite, and B. P. Yaskelyavichene.
Tr Vses Nauchno-Issled Inst Prudvogo Rybn Khoz. 20: p 72-86. 1971. English summary.
Identifiers: Breeding, *Carp, Densities, *Fertilization, Hydrobiology, Methods, Phytoplankton, Ponds, Stocking.

The seasonal dynamics of the biomass of phytoplankton, zooplankton and benthos in 18 experimental breeding ponds stocked with carp fingerlings at a density of 15 thousand/ha without feeding and 45,000/ha with feeding during fertilization by different methods was studied. Fertilization of breeding ponds with liquid compost and superphosphate according to biological requirements was an effective means of stimulating phytoplankton development at low and high densities of stocking. During the first half of the summer the use of only mineral fertilizer was the most effective. Despite the consumption of zooplankton by fish, the biomass of zooplankton was higher in ponds where the fish were raised with feeding under dense stocking conditions compared to ponds without feeding. This indicated the intensive fertilizing effect of fine bits of residue from food and experimental fish.--Copyright 1972, Biological Abstracts, Inc.
W73-08529

THE MODIFICATION OF BIOCENOSIS AFTER INTRODUCING THE GRASS CARP (CTENOPHARYNGODON IDELLA (VAL.)) IN THE POND FRASINET (DISTRICT ILFOV), (IN RUMANIAN),
Institutul de Cercetari si Proiectari Aliment., Bucharest (Rumania).
V. Cure.
Stud Cercet Piscis Inst Cercet Proiect Aliment. 4, p 3-58. 1971. Illus. (English summary).
Identifiers: *Fish establishment, *Environmental effects, Biocenosis, Carp, Ctenopharyngodon idella, Fish management, Modification, Romania.

Modification of the pond ecosystem after introducing this carp is analyzed. The importance of proper management procedures to prevent unfavorable feedback in an artificially altered ecosystem is stressed.--Copyright 1972, Biological Abstracts, Inc.
W73-08553

USE OF MICRO-ALGAE SUSPENSION IN FEEDING BALTIC SALMON JUVENILES, (IN RUSSIAN),
T. M. Aronovich.
Tr Vses Nauchno-Issled Inst Prudovogo Rybn Khoz. 18: p 11-16. 1971. (English summary).
Identifiers: *Fish diets, Algae, Baltic, Chlorella, Juveniles, Salmo salar, Salmon, Scenedesmus, Suspension.

Supplements of micro-algae (Chlorella and Scenedesmus cultures) in the food of juvenile Baltic salmon (Salmo salar) during raising in fish hatcheries were highly effective.--Copyright 1972, Biological Abstracts, Inc.
W73-08554

DOWNSTREAM MIGRATION OF VOBLA, BREAM AND WILD CARP FROM ARAKUMSK BODIES OF WATER, (IN RUSSIAN),
K. A. Adzhimuralov.
Sb Nauchn Soobshch Kafedry Fiziol Cheloveka Zhivotn Zool Biol Khim Dagest Univ. 4. p 49-52. 1970.
Identifiers: *Fish management, Arakumsk, Bream, Carp, Downstream, *Fish migration, USSR, Vobla.

In Arakumsk bodies of water in the Dagestan ASSR, 2 forms of downstream migration by juveniles from the spawning grounds were observed: passive and active. The passive form was observed in April as result of unfavorable factors: hunger, disturbances in the temperature and the changes in the water level. Active migration was observed in May-July, when the juveniles reached the downstream-migrant stage. For normal downstream migration regulation of the water supply and increases in its flow at the spawning ground in the direction of the fishway are necessary.--Copyright 1972, Biological Abstracts, Inc.
W73-08600

STUDY OF IMPROVING THE QUALITATIVE COMPOSITION OF CARP FOOD. METHODS OF FEEDING, (IN RUSSIAN),
F. M. Sukhoverkhov.
Tr Vses Nauchno-Issled Inst Prudovogo Rybn Khoz. 17 p 36-46. 1971. English summary.
Identifiers: *Fish diets, *Carp, Composition, Feeding, Methods, Yeast.

Methods for experimental feeding of carp are discussed, including the use of duplicate experimental ponds, production checks, correct selection of ponds, stocking material and dietary requirements. The optimal norms of food supplements of dietary yeasts, tissue preparation, terramycin, carotene, vitamin B12, phosphatides and microelements (C0) are established.--Copyright 1972, Biological Abstracts, Inc.
W73-08609

THE INDUCED SPAWNING OF THE PHYTO- AND PLANKTOPHAGOUS FISHES FROM THE EXPERIMENTAL STATION NUCET DURING 1966-1970, (IN RUMANIAN),
Institutul de Cercetari si Proiectari Aliment., Bucharest (Rumania).
A. Nicolau, S. Luscan, and E. Nichiteanu.
Stud Cercet Piscic Inst Cercet Proiect Aliment. 4: 273-298, Illus, 1971. English summary.
Identifiers: *Fish reproduction, Aristichthys nobilis, Ctenopharyngodon idella, Fishes, Hypophthalmichthys molitrix, Nucet, Phytophagous fish, Pituitary treatment, Planktophagous fish, Romania, *Spawning.

Results are presented on induced spawning of the grass carp (Ctenopharyngodon idella), the silver carp (Hypophythalmichthys molitrix) and Aristichthys nobilis during a period of 5 yr. The factors affecting and determining the variations of the percentage of ripened gonads from females subject to pituitary treatment, the fecundity, the survival rate from ova until 5 days old, and the number of 5-day old fry were analyzed. The ponds and the local climate offer to phytophagous and planktonophagous fishes favorable conditions for growth and spawning. H. molitrix and A. nobilis had great quantities of natural food. The induced spawning was influenced by complex internal and external factors. The physiological conditions of the spawners are discussed.--Copyright 1972, Biological Abstracts, Inc.
W73-08614

THE NATURAL AND SUPPLEMENTARY FEEDING ECOLOGY OF POND CARP, (IN RUMANIAN),
Inst. Cercet. Project. Aliment., Bucuresti, Rom. Institutul de Cercetari si Proiectari Aliment., Bucharest (Rumania).
M. Niculescu-Duvaz.
Stud Cercet Piscic Inst Cercet Project Aliment. 4 p 59-251. Illus. 1971. English summary.
Identifiers: *Carp, *Fish diets, Ecology, Feeding, Fish growth, Production.

Detailed analysis is presented on the importance of supplementary feeding and the necessary pond conditions for increased growth and production of this valuable fish.--Copyright 1972, Biological Abstracts, Inc.
W73-08633

COREGONOID FISH OF SIBERIA. BIOLOGICAL BASIS ON COMMERCIAL EXPLOITATION AND REPRODUCTION OF RESOURCES, (IN RUSSIAN),
B. K. Moskalenko.
Pishch. Prom-st': Moscow. 1971. 184p Illus.
Identifiers: *Cisco, *Commercial fish, Biology, Dynamics, Exploitation, Fish population, Fish reproduction, Siberia, USSR.

The descent and distribution of coregonoid fish of Eurasia, migration, reproduction, feeding, nutritional interrelationships, population dynamics and productivity are covered. A biological characterization of commercial species including 'muksun,' cisco, omul, 'pizhyan,' broad whitefish, 'peled' and tugun, evaluation of reserves, and regulation of fishing and artificial propagation are included.--Copyright 1972, Biological Abstracts, Inc.
W73-08637

EFFICIENCY OF PROTEINS IN RELATION TO THEIR CONCENTRATION IN THE RAINBOW TROUT DIET, (IN FRENCH),
P. Luquet.
Ann Hydrobiol. Vol 2 No 2, p 175-186. 1971. Illus. English summary.
Identifiers: Concentration, *Fish diets, Herring, Maize M, *Proteins, *Rainbow trout.

Four semi-synthetic diets based on herring meal and raw maize starch containing 30-60% protein were given ad lib to 4 groups of rainbow trout for 36 wk. The body weight composition, food consumption and protein utilization were studied. A weight gain of 200 g in 36 wk was obtained. It is estimated that trout require less than 30% protein in their diet under similar conditions.--Copyright 1972, Biological Abstracts, Inc.
W73-08642

INTRODUCTION OF SALMONIDS IN THE KERGUELEN ISLANDS: I. FIRST RESULTS AND PRELIMINARY OBSERVATIONS, (IN FRENCH),
Station d'Hydrobiologie Continentale, Biarritz (France).
R. Lesel, Y. Therezien, and R. Vibert.
Ann Hydrobiol. Vol 2, No 2, p 275-304. 1971. Illus. English summary.

Identifiers: *Fish establishment, *Fish diets, Condition, Insects, Kerguelen, Islands, Plankton, Salmonids.

Preliminary observations indicate that the condition factor for lake trout living in rivers is moderate, whereas that of fish living in lakes is good. The study of food shows 2 diets: one essentially based on plankton in lakes, the other on insect larvae of exogenous origin in streams and rivers.--Copyright 1972, Biological Abstracts, Inc.
W73-08643

CONDITION AND FATNESS OF THE GRASS CARP CTENOPHARYNGODON IDELLA (VAL.) IN THE AMUR BASIN (IN RUSSIAN),
Tikhookeanskii Nauchno-Issledovatelskii Institut Rybnogo Khozyaistva i Okeanografii, Khabarovsk (USSR).
E. I. Gorbach.
Vopr Ikhtiol, Vol 11, No 6, p 1002-1013, 1971, Illus.
Identifiers: *Fish physiology, Amur Basin, *Carp, Condition, Ctenopharyngodon idella, Fatness, USSR, Fish diets.

The condition and fatness of C. idella as a function of size, age, sex, stage of gonadal maturity, season, and food supply were investigated. It was established that the changes of the condition and fatness of this species are governed by the physiological state of the organism and by the effect of the food supply.--Copyright 1972, Biological Abstracts, Inc.
W73-08822

COLLECTION OF JUVENILE SALMON AND STEELHEAD TROUT PASSING THROUGH ORIFICES IN GATEWELLS OF TURBINE INTAKES AT ICE HARBOR DAM,
National Marine Fisheries Service, Seattle, Wash. Biological Lab.
D. L. Park, and W. E. Farr.
Trans Am Fish Soc. Vol 101, No 2, p 381-184. 1972. Illus.
Identifiers: Collection, Dam, Gatewells, Ice Harbor Dam, Juvenile, Orifices, Passing, *Salmon, *Steelhead trout, Turbine intakes, *Washington.

A total of 172,785 juvenile salmon and steelhead trout were trapped over a 2-mo period by the collection system at Ice Harbor Dam, Washington, and the ability of the system to capture and hold a large number of fish is demonstrated. Its applicability to other dams where orifices are constructed is indicated. This provides sufficient numbers of the fish in good condition for transportation studies.--Copyright 1973, Biological Abstracts, Inc.
W73-08983

STUDIES ON GILL PARASITOSIS OF THE GRASSCARP (CTENOPHARYNGODON IDELLA) CAUSED BY DACTYLOGYRUS LAMELLATUS ACHMEROW, 1952: II. EPIZOOTIOLOGY,
K. Molnar.
Acta Vet Acad Sci Hung. Vol 21, No 4, p 361-375. 1971. Illus.
Identifiers: *Carp, Ctenopharyngodon-Idella, Dactylogyrus-Lamellatus, Epizootiology, Gill, *Parasitosis, Temperature.

The gill parasite D. lamellatus affected grasscarp of all ages and sizes throughout the year. A high stocking density favors its spread, and thus the parasite threatens the populations primarily of the fry-rearing ponds, nursery ponds and wintering ponds. The fatal outcome of dactylogyrosis depends on the parasite count of the host, but a warm temperature and a low O2 content of the water accelerate its onset. Three epizootiologically different forms of D. lamellatus infection were observed in ponds farms: acute dactylogyrosis of the fry, and subacute and chronic dactylogyrosis of 1 and 2 summer grasscarps. A continuous low-degree infestation with D. lamellatus protected the fishes against a not too massive reinfection by larval stages of the parasite. This kind of host-parasite equilibrium seems to depend on the individual resistance of the host. (See also W73-09003)--Copyright 1972, Biological Abstracts, Inc.
W73-09002

STUDIES ON GILL PARASITOSIS OF THE GRASSCARP (CTENOPHARYNGODON IDELLA) CAUSED BY DACTYLOGYRUS LAMELLATUS ACHEMEROW, 1952: III. THERAPY AND CONTROL,
K. Molnar.
Acta Vet Acad Sci Hung. Vol 21, No 4, p 377-382. 1971.
Identifiers: *Carp, Ctenopharyngodon-Idella, Dactylogyrus-lamellatus, Ditrifon, E, Flibol, Garoona, Gill, Host, Nuvanol, Parasit-drugs, *Parasitosis, USSR.

Experimental and field observations showed that the establishment of D. lamellatus infection among grasscarp fry can be prevented by supplying the water from reservoir ponds not populated with older infected fishes and by removal of the growing fry to larger ponds before the population becomes too high. Bathing of the hosts in a 2.5% NaCl solution kills D. lamellatus and the organic phosphoric acid ester solutions (Ditrifon 50, Flibol E, Nuvanol, Gardona) tested for long-term action were 100% effective when applied to a concentration of 1 ppm for 48 hr. Ditrifon 50, also tested for short-term action at a concentration of 100 ppm, killed all parasites in 0.5-4 hr. The combination of breeding technological and chemotherapeutic methods ensures effective control of grasscarp dactylogyrosis. (See also W73-09002)--Copyright 1972, Biological Abstracts, Inc.
W73-09003

PISCIVOROUS ACTIVITIES OF BROWN BULLHEADS IN LOCKHART POND, ONTARIO, CANADA,
Guelph Univ., (Ontario). Dept. of Zoology.
J. W. Moore.
Prog Fish-Cult. Vol 34, No 3, p 141-142, 1972. Illus.
Identifiers: *Bullheads (Brown), Canada, Ictalurus-nebulosus, Lepomis-gibbosus, Lockhart pond, Notemigonus-crysoleucas, Ontario, *Piscivorous, Ponds.

Brown bullhead (Ictalurus nebulosus) greater than 21.5 cm, collected from Lockhard Pond, Ontario, Canada, fed mainly on fish (88% by volume). Pumpkinseeds (Lepomis gibbosus) comprised 55% of the total stomach volume, golden shiners (Notemigonus crysoleucas) 15%, and unidentified fish remains, 18%. Invertebrates, primarily larval Chironomidae, comprised the remaining 12%. High population density of bullheads, high incidence of encounter betwen bullheads and other fish species, and semidystrophic limnological conditions may be responsible for the unusual feeding habits.--Copyright 1973, Biological Abstracts, Inc.
W73-09040

ENERGY METABOLISM AND FOOD RATIONS OF STEELHEAD TROUT UNDER CONDITIONS OF THE CHERNAYA RACHKA TROUT INDUSTRY, (IN RUSSIAN),
E. P. Skazkina.
Tr Vses Nauchno-Issled Inst Morsk Rybn Khoz Okeanogr. 76, p 130-134, 1970. English summary.
Identifiers: Chernaya Rechka, Food, *Metabolism, Rations, *Steelhead trout, USSR, *Trout.

Properties of metabolism are discussed for early steelhead juveniles which were received from the USA and raised on Chernorechenskaya trout. The larval rations were computed by respiration method. The obtained values for growth and energy metabolism were very small. This was evidently due to the constant low water temperature in the streams of Chernaya Rechka.--Copyright 1972, Biological Abstracts, Inc.
W73-09044

DIETARY CHARACTERISTICS OF SILVER CARP AND GRASS CARP LARVAE AT VARIOUS STAGES OF DEVELOPMENT, (IN RUSSIAN),
A. I. Strelova.
Tr Vses Nauchno-Issled Inst Prudovogo Rybn Khoz. 18, p 188-194, 1971. English summary.
Identifiers: *Carp, Cyclops, *Dietary studies (Carp), Grass carp, Larvae, *Rotifers, Silver carp.

Experiments in aquariums and pond observations showed that rotifers were the basic food component of silver carp and grass carp at 24 stage of development. When there was an insufficiency of rotifers in the food of both species, the fish began to consume small Cyclops. Larvae of the 2 spp. are competitors for rotifers in the first stage and copepodid cyclops in the second and third.--Copyright 1972, Biological Abstracts, Inc.
W73-09045

CONDITION OF RESOURCES, SOME BIOLOGICAL TRAITS AND PERSPECTIVES ON REPRODUCTION OF THE AMUR STURGEON AND STERLET, (IN RUSSIAN),
V. G. Svirskii.
Uch Zap Dal'nevost Univ. Vol 15, No 31, 1971.
Identifiers: Amur sturgeon, Biological studies, *Reproduction, *Sterlet, *Sturgeon, USSR.

Kaluga, Amur sturgeon, green sturgeon and sterlet inhabit the Amur River basin. Introduction of sterlet was begun in 1956. The dynamics of catches of sturgeon were studied for the period 1891-1964. The large-scale operation of artificial breeding was registered. In all 30,000 juveniles of the same age were put into the Amur.--Copyright 1972, Biological Abstracts, Inc.
W73-09046

SEASONAL RACES OF PINK SALMON ON THE KURIL ISLANDS, (IN RUSSIAN),
V. N. Ivankov.
Uch Zap Dal'nevost Univ. Vol 15, No 3, p 34-43, 1971.
Identifiers: Fecundity, Islands, *Kuril Islands, Races, *Salmon (Pink),Seasonal, *Spawning, USSR.

In the Slavnaya River on Iturup Island 499 juveniles and 10,250 adult fish were analyzed. The existence of summer and autumn races differing by the traveling time to spawning grounds, spawning ground location, dimensions, growth rate, fecunity, condition of the gonads and period of spawning migration was confirmed. Juvenile pink salmon from each race migrated downstream at different times: the peak for the summer race occurred during the third 5-day period of May, in the autumn race it was the first-second 5-day period in June. Differences in the duration of the migration were reflected in the scale structure. The scales in the first yr zone had a greater number of sclerites in the summer variety. In an area where both races occurred, the spawning area was used more extensively, which increased the reproductive efficiency of this salmon. The distribution of silver salmon in the Kuril Islands was mosaic-like. The center of intraspecies biological differentiation in this region was on Iturup Island. Mostly summer silver salmon reproduced in its northern area and autumn salmon in the south.--Copyright 1972, Biological Abstracts, Inc.
W73-09047

CONDITION OF THE BROOD STOCK OF AUTUMN CHUM IN THE AMUR RIVER LIMAN

AND SOME OF ITS TRIBUTARIES, (IN RUSSIAN),
L. K. Platoshina.
Uch Zap Dal'nevost Univ. Vol 15 No 3, p 44-50. 1971.
Identifiers: *Amur River Liman, Brood, *Chum, *Hypophysis, Rivers, Stock, Tributaries, USSR.

Morphobiological differences in autumn chum from different tributaries of the Amur were associated with the condition of the hypophysis. Information was gathered in the liman of the Amur in the Baidukov Island area and estuaries of the Chome and Bir Rivers. The data from biometric analysis were treated statistically. Chum of different tributaries differed in size, weight, fecundity, and coefficients of fattening and maturity. The age compositions of the local schools were similar. Differences in the processes of formation, accumulation and outflow of hypophyseal secretion were observed in representatives of local schools spawning in the lower reaches of the Amur and migrating to spawn in the upper reaches. In the Baidukov Island region there was merely preparation for secretion in others. In the Chome estuary strong secretion of basophilic cells of the mesoadenohypophysis was observed.--Copyright 1972, Biological Abstracts, Inc.
W73-09048

STATUS AND PERSPECTIVE DEVELOPMENT OF FISH BREEDING IN THE VOROSHILOVGRAD OBLAST, (IN RUSSIAN),
A. A. Alekseenko, A. M. Berchak, and M. D. Luk'yanchenko.
Rybn Khoz Resp Mezhved Temat Nauchn Sb. 12. p 24-26. 1971.
Identifiers: Breeding, *Fish breeding, USSR, *Voroshilovgrad Oblast, Pisciculture.

The state of pisciculture in the Voroshilovgrad Oblast and an analysis of the production-industrial activity of the central establishment are discussed.--Copyright 1972, Biological Abstracts, Inc.
W73-09049

DISTRIBUTION OF FISH ACCORDING TO THE TYPE OF WATER IN THE GAME RESERVE, (IN RUSSIAN),
Y. I. Zapekina-Dul'keit, and G. D. Dul'keit.
Tr Gos Zapovednika 'Stolby.' 8 p 70-79. 1971.
Identifiers: *Distribution (Fish), *Game reserve, Species, USSR.

A short characterization of bodies of water in the game reserve 'Stolby' where there are 22 spp. of fish from 10 families is presented. The distribution of fish in various bodies of water is discussed.--Copyright 1972, Biological Abstracts, Inc.
W73-09050

ROLE OF RECRUITMENT IN THE CREATION OF INDUSTRIAL STOCKS AND EVALUATION OF FISH RESERVES (IN RUSSIAN),
T. F. Dement'eva.
Tr Vses Nauchno-Issled Inst Morsk Rybn Khoz Okeanogr. 79 p 50-57. 1971. (English summary).
Identifiers: Commercial, *Fish reserves, *Industrial stocks, Recruitment, Stocks.

A method of calculating the composition of the year's additions to the stock developed by G. N. Monastyrskii on the basis of the work of native and foreign studies permits determination of additions to commercial schools, the size of which vary widely according to changes in abiotic and biotic conditions during periods of embryogenesis and conversion of larvae to mixed food. Further study revealed basic principles which cause variations in recruitment for many commercial fish and the role of biological properties of population such as growth, age of maturity and natural death in the formation of commercial schools.--Copyright 1972, Biological Abstracts, Inc.
W73-09051

INCREASING THE USE OF FOOD RESERVES IN BODIES OF WATER BY MEANS OF AGE-RELATED STRUCTURES (IN RUSSIAN),
M. V. Zheltenkova.
Tr Vses Nauchno-Issled Inst Morsk Rybn Khoz Okeanogr. 79 p 72-77. 1971. (English summary).
Identifiers: *Age (Fish), *Fish size, Food reserves, Structures.

The food spectrum increased along with increases in the size of fish. The younger specimens consumed small organisms with little mobility while the older ones fed on large, quickly moving organisms and those with powerful defenses. Feeding and the extent of migration increase with size. As a result, the amount of food accessible to the whole population increased.--Copyright 1972, Biological Abstracts, Inc.
W73-09052

WINTERING OF THE BELUGA STERLET HYBRIDS IN WESTERN GEORGIA (IN RUSSIAN),
E. N. Fedoseeva.
Sb Nauchno-Issled Rad Vses Nauchno-Issled Inst Prudovogo Rybn Khoz. 4 p 127-132. 1970. (English summary).
Identifiers: *Fish diets, Georgia (USSR), Hybrids, *Sterlet (Beluga), USSR, Wintering.

In the mild climate of Western Georgia wintering of the hybrids beluga X sterlet took place in normal carp ponds of the summer type. Two-yr old hybrids weighting 200-300 g did not stop feeding and in the majority of cases gained weight during the winter. Fish weighing over 400 g gained only in 30 cases. Management of food during the winter is recommended for these hybrids.--Copyright 1972, Biological Abstracts, Inc.
W73-09053

EFFECT OF A TISSUE PREPARATION ON CARP GROWTH,
F. M. Sukhoverkhov, G. B. Gribanova, N. V. Pechnikova, and M. R. Sidel'nikov.
Tr Vses Nauchno-Issled Inst Prudovogo Rybn Khoz. 20 p 152-160. 1971. (English summary).
Identifiers: *Carp growth, *Tissue preparation, Fish food.

Experiments on the introduction of a tissue preparation into the food to increase growth and productivity of carp were studied. The tissue preparation stimulated growth in yearlings and underyearlings. Different doses were tested. The best results for the growth of yearlings and for a decrease in food consumption per unit weight increase were obtained with 7 g/kg daily. This dose increased growth by 17.4 and decreased food consumption per unit of weight increase by 9.4%. For underyearlings a dose of 3.5 g/kg had the best growth stimulating effect, increasing growth by 17% compared to the control. --Copyright 1972, Biological Abstracts, Inc.
W73-09054

QUINNAT SALMON INVESTIGATIONS: REVIEW OF INVESTIGATIONS OF TECHNICAL FIELD SERVICE OF THE COUNCIL OF SOUTH ISLAND ACCLIMATISATION SOCIETIES: FEBRUARY 1969,
Marine Dept., Christchurch (New Zealand). Fisheries Lab.
C. J. Hardy.
N Z Mar Dep Fish Tech Rep. 84. p 1-38. 1972. Illus.
Identifiers: Acclimatization, Field, Islands, New Zealand, *Quinnat salmon, *Reviews, *Salmon, Service.

Quinnat salmon were introduced into New Zealand from California at the turn of the century and by the early 1920's good catches of quinnat were being reported from all the major South Island east coast rivers from the Waiau to the Clutha. The utilization and present status of quinnat salmon stocks are described. Progress is reviewed of investigations being undertaken by the Technical Field Service of the Council of South Island Acclimatization Societies principally on the Glenariffe Stream which is a tributary of the Rakaia River.--Copyright 1973, Biological Abstracts, Inc.
W73-09075

09. MANPOWER, GRANTS AND FACILITIES

9A. Education (Extramural)

ACADEMIC PROGRAMS IN ENVIRONMENTAL STUDIES,
California Univ., Berkeley. Sanitary Engineering Research Lab.
For primary bibliographic entry see Field 06A.
W73-08648

10. SCIENTIFIC AND TECHNICAL INFORMATION

10A. Acquisition And Processing

ENVIRONMENTAL DATA BANK.
For primary bibliographic entry see Field 07C.
W73-08663

10C. Secondary Publication And Distribution

ESTUARINE POLLUTION, A BIBLIOGRAPHY.
Office of Water Resources Research, Washington, D.C.
For primary bibliographic entry see Field 02L.
W73-08451

PROBLEMS AND TECHNIQUES OF KARST RESEARCH (PROBLEMY IZUCHENIYA KARSTA I PRAKTIKA),
For primary bibliographic entry see Field 02K.
W73-08881

AERIAL REMOTE SENSING, A BIBLIOGRAPHY.
Office of Water Resources Research, Washington, D.C.
For primary bibliographic entry see Field 07B.
W73-08974

CONCENTRATION FACTORS OF CHEMICAL ELEMENTS IN EDIBLE AQUATIC ORGANISMS,
California Univ., Livermore. Lawrence Livermore Lab.
For primary bibliographic entry see Field 05B.
W73-08992

10F. Preparation of Reviews

WATER POLLUTION CONTROL, A STATE-OF-THE-ART REVIEW,
Port of New York Authority, N.Y.
For primary bibliographic entry see Field 05D.
W73-08900

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A. Centers of Competence		
AEC Oak Ridge National Laboratory, Nuclear Radiation and Safety	W73-08991 -- 08997	7
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Office of Water Resources Research	W73-08451, 08974	2

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CENTERS OF COMPETENCE AND THEIR SUBJECT COVERAGE

- Ground and surface water hydrology at the Water Resources Division of the U.S. Geological Survey, U.S. Department of the Interior.
- Metropolitan water resources planning and management at the Center for Urban and Regional Studies of University of North Carolina.
- Eastern United States water law at the College of Law of the University of Florida.
- Policy models of water resources systems at the Department of Water Resources Engineering of Cornell University.
- Water resources economics at the Water Resources Center of the University of Wisconsin.
- Design and construction of hydraulic structures; weather modification; and evaporation control at the Bureau of Reclamation, Denver, Colorado.
- Eutrophication at the Water Resources Center of the University of Wisconsin, jointly sponsored by the Soap and Detergent Association and the Agricultural Research Service.
- Water resources of arid lands at the Office of Arid Lands Studies of the University of Arizona.
- Water well construction technology at the National Water Well Association.
- Water-related aspects of nuclear radiation and safety at the Oak Ridge National Laboratory.
- Public water supply treatment technology at the American Water Works Association.

Supported by the Environmental Protection Agency in cooperation with WRSIC

- Thermal pollution at the Department of Sanitary and Water Resources Engineering of Vanderbilt University.
- Water quality requirements for freshwater and marine organisms at the College of Fisheries of the University of Washington.
- Wastewater treatment and management at the Center for Research in Water Resources of the University of Texas.
- Methods for chemical and biological identification and measurement of pollutants at the Analytical Quality Control Laboratory of the Environmental Protection Agency.
- Coastal pollution at the Oceanic Research Institute.
- Water treatment plant waste pollution control at American Water Works Association.
- Effect on water quality of irrigation return flows at the Department of Agricultural Engineering of Colorado State University.

Subject Fields

1 NATURE OF WATER

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3 WATER SUPPLY AUGMENTATION AND CONSERVATION

4 WATER QUANTITY MANAGEMENT AND CONTROL

5 WATER QUALITY MANAGEMENT AND PROTECTION

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